

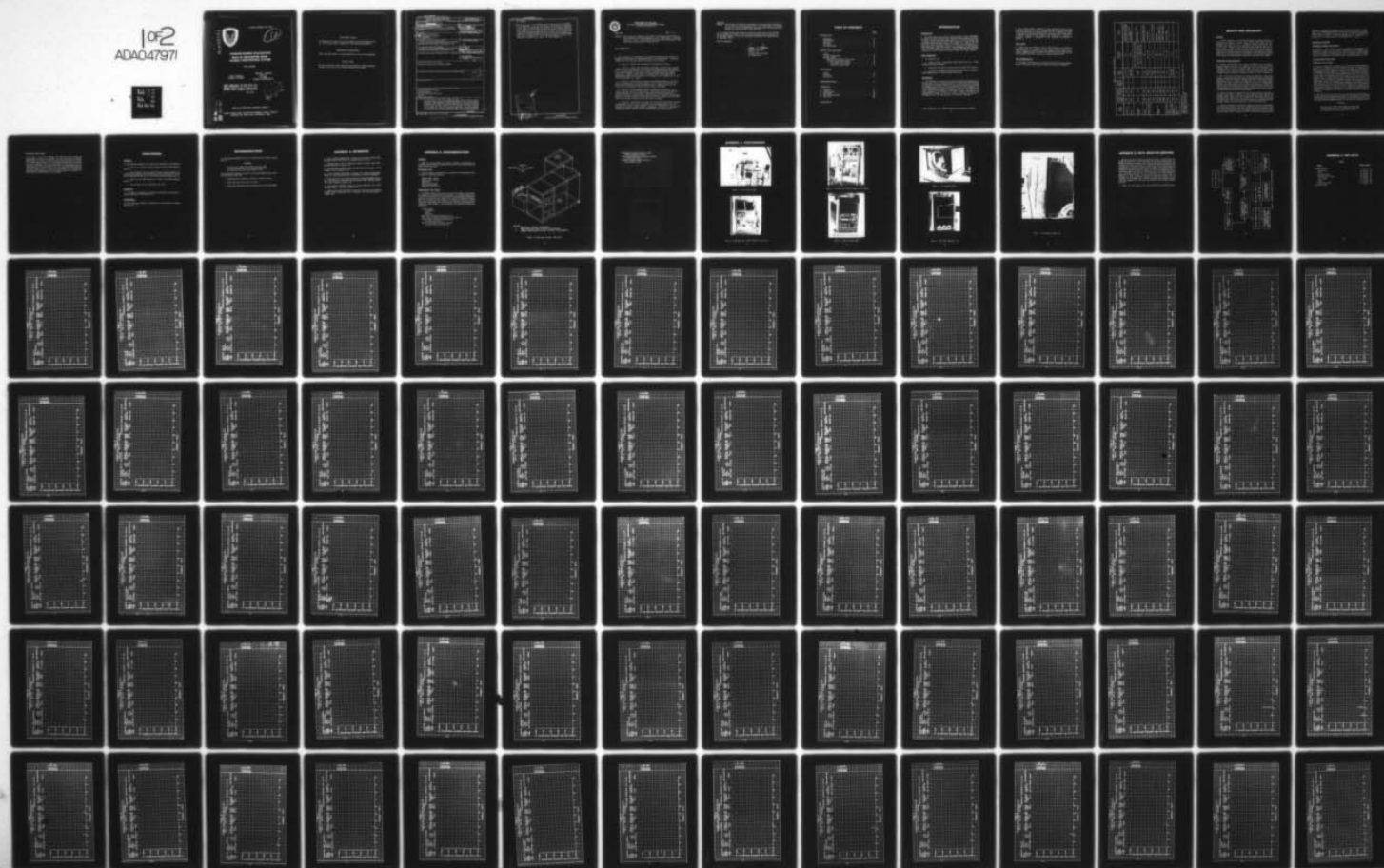
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ARMY AVIATION ENGINEERING FLIGHT ACTIVITY EDWARDS AF--ETC F/G 1/3
AIRWORTHINESS EVALUATION NUH-1H HELICOPTER WITH GLOBAL POSITION--ETC(U)
MAY 77 C L THOMAS, T P BENSON
USAAEFA-76-13

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USAAEFA PROJECT NO. 76-13

P.S. 12

**AIRWORTHINESS EVALUATION
NUH-1H HELICOPTER WITH
GLOBAL POSITIONING SYSTEM**

FINAL REPORT

**TOM P. BENSON
PROJECT ENGINEER**

**CHARLES L. THOMAS
MAJ, CE
US ARMY
PROJECT OFFICER/PILOT**

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MAY 1977



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**UNITED STATES ARMY AVIATION ENGINEERING FLIGHT ACTIVITY
EDWARDS AIR FORCE BASE, CALIFORNIA 93523**

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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Limited airworthiness evaluation NUH-1H helicopter Prototype global positioning system Vibration Pilot induced oscillation		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The United States Army Aviation Engineering Flight Activity conducted a limited airworthiness flight evaluation of an NUH-1H helicopter in which a prototype global positioning system (GPS) was installed. Flight tests were conducted at Edwards Air Force Base, California, between 18 and 27 January 1977. Nine test flights were conducted for a total of 11 productive flight hours. Testing was performed to determine the effect of GPS installation on vibration and pilot-induced oscillation (continued)		

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20. Abstract

→ (PIO) characteristics of the NUH-1H helicopter. During this test, one deficiency and one shortcoming were noted. The deficiency was insufficient aft longitudinal control margin in rearward flight. The shortcoming was insufficient directional control margin in hover and low-speed flight. The deficiency and the shortcoming were a result of the gross weight and center of gravity of the helicopter after installation of the GPS, although both were within normal UH-1H operating limits. There was no significant effect on vibration characteristics or increase in PIO tendencies of the NUH-1H as a result of the GPS installation. ↑

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DEPARTMENT OF THE ARMY
HQ, US ARMY AVIATION RESEARCH AND DEVELOPMENT COMMAND
P O BOX 209, ST. LOUIS, MO 63166

DRDAV-EQA

OCT 27 1977

SUBJECT: Directorate for Research, Development and Engineering Position on the Conclusions and Recommendations of the Final Report on USAAEFA Project No. 76-13, Airworthiness Evaluation NUH-1H Helicopter with Global Positioning System, dated May 1977

SEE DISTRIBUTION

1. The Directorate for Research, Development and Engineering position on USAAEFA's conclusions and recommendations are provided herein. Paragraph numbers from the subject report are provided for reference.

a. Para 16. Concur with the general conclusions set forth.

b. Para 17. Concur with the stated deficiency for this test aircraft however it is noted that the insufficient aft longitudinal control margin is not a result attributable to the Global Positioning System installation but a characteristic of the basic UH-1H for forward center-of-gravity conditions. Numerous other data is available from the original UH-1D development program which indicates the aircraft to be satisfactory at the current published c.g. limits.

c. Para 18. Concur with the stated shortcoming however it is noted that the insufficient left pedal margin is not a result attributable to the Global Positioning System installation but a characteristic of the basic UH-1H at high gross weights and/or density altitudes.

d. Para 19. No operational problem is known to exist due to the control problem defined in this report. Additional analysis and specific testing dedicated to the purpose of defining a suitable operational envelope in terms of gross weight, center-of-gravity location and rearward flight or downwind hovering is required and will be planned for early 1978. Until this is done, current limits will not be changed.

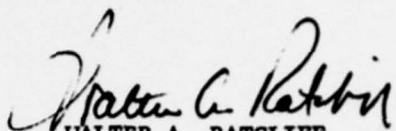
e. Para 20. Concur with the intent of the stated restrictions however an alternative to the 10 knot limitation for downwind hover is that of limiting the forward center-of-gravity location. Additionally the current operation's manual contains adequate information in terms of a caution, warning and charts relative to the insufficient left pedal margin.

DRDAV-EQI

SUBJECT: Directorate for Research, Development and Engineering Position on the Conclusions and Recommendations of the Final Report on USAAEFA Project No. 76-13, Airworthiness Evaluation NUH-1H Helicopter with Global Positioning System, dated May 1977.

2. The Global Positioning System as installed and tested on the NUH-1H had no significant effect on the flying and handling characteristics and is therefore subject to the same operating information and restrictions as the basic UH-1H.

FOR THE COMMANDER:



WALTER A. RATCLIFF

Colonel, GS

Director of Development
and Engineering

TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION	
Background	2
Test Objectives	2
Description	2
Test Scope	3
Test Methodology	3
RESULTS AND DISCUSSION	
General	5
Vibration Characteristics	5
Handling Qualities	6
Pilot-Induced Oscillation Characteristics	6
Low-Speed Flight Characteristics	6
Longitudinal Control Margin	6
Directional Control Margin	7
CONCLUSIONS	
General	8
Deficiency	8
Shortcoming	8
RECOMMENDATIONS	9
APPENDIXES	
A. References	10
B. Instrumentation	11
C. Photographs	14
D. Data Analysis Methods	18
E. Test Data	20
DISTRIBUTION	

INTRODUCTION

BACKGROUND

1. The United States Army Aviation Engineering Flight Activity (USAAEFA) was directed by the United States Army Aviation Systems Command (AVSCOM)* to conduct a limited airworthiness flight evaluation of an NUH-1H helicopter with a prototype global positioning system (GPS) installed (ref 1, app A). The GPS tested was a prototype system designed for evaluation of the GPS concept. The final design will be significantly reduced in size and weight. The GPS project is under the guidance of the United States Air Force Headquarters, Space and Missile Organization (Hq SAMSO) at Los Angeles, California. The GPS was designed and constructed by General Dynamics Electronics Division, San Diego, California.

TEST OBJECTIVES

2. Test objectives were:
- a. Evaluate vibration characteristics during ground runs and in flight, including GPS pallet resonances.
 - b. Determine if GPS pallets cause pilot-induced oscillation (PIO) tendencies.
 - c. Conduct an airworthiness evaluation which will serve as a basis for a safety-of-flight release for future prototype GPS testing.

DESCRIPTION

3. The NUH-1H test helicopter, serial number 66-60869, was manufactured by Bell Helicopter Textron. A detailed description of the standard UH-1H helicopter is contained in the operator's manual (ref 2, app A). The test aircraft was modified for installation and operation of the prototype GPS. A detailed description of the aircraft modification is contained in reference 3. Most of the modification was to the aircraft electrical system for powering the GPS and to the interior of the cargo compartment for installation of the GPS. A detailed description of test instrumentation installed in the test aircraft is presented in appendix B. Photographs of the test instrumentation are contained in appendix C.

*Since redesignated Army Aviation Research and Development Command.

4. The prototype GPS is composed of three components, with the main component located forward of the transmission housing. The approximate weight of the main component is 1336 pounds. The other two components are located on each side of the transmission housing with a combined weight of 496 pounds. A detailed description of the prototype GPS components is contained in reference 3, appendix A. Photographs of the installation are presented in appendix C.

TEST SCOPE

5. Flight testing of the NUH-1H with the GPS installation was conducted at Edwards Air Force Base, California, between 18 and 27 January 1977. Nine test flights consisting of 11 productive hours were conducted at the conditions shown in table 1. Flight limitations contained in the UH-1H operator's manual and the safety-of-flight release (ref 4, app A) were observed during the test.

TEST METHODOLOGY

6. The flight test methods used are described briefly in the Results and Discussion section of this report. Data analysis methods are discussed in appendix D.

Table 1. Flight Test Conditions.

Flight Regime	Average Gross Weight (lb)	Average Density Altitude (ft)	Average Ambient Temperature (°C)	Rotor Speed (rpm)	Calibrated Airspeed ¹ (kt)	Remarks
Ground run	8550	2220	14	192 to 330	Zero	Ground-idle to flight-idle (192 to 370 rpm)
Hover ²	8900	2160	14	314, 319, and 324	Zero	5, 10, and 15-foot skid heights
Low-speed flight	8900	1500	6	314 and 324	Zero to 30 KTAS ³ left and right	Skid height 10 and 20 feet
					Zero to 30 KTAS forward	
					Zero to 13 KTAS rearward	
Climb	8780	4100	8	324	80	Maximum engine power
Forward flight	8900	4000	7	314 and 324	40 to 110	Level flight
Maneuvering flight ⁴	8600	5000	8	314 and 324	40 to 110	Pushovers to pull-ups
	9100	5000	8	324	100	Pull-outs
	9240	4220	9	324	80	Windup turns, left
	8640	4120	8	324	80	Windup turns, right
Autorotational entry	9080	5000	6	324	50 to 100	Level flight
Autorotational descent	8760	5000	6	314, 319, and 324	60	---
Nap-of-the-earth	9160	1520	4	324	Zero to 100	---

¹Unless otherwise noted.²Step and pulse control inputs in lateral and longitudinal axes.³KTAS: Knots true airspeed.⁴Load factors 0.25 to 2.0.

RESULTS AND DISCUSSION

GENERAL

7. A limited evaluation of the NUH-1H helicopter with GPS installed was performed to determine if increased aircraft vibration characteristics and PIO tendencies were associated with the installation. Results of these tests were compared with results from earlier evaluations of the UH-1H helicopter (refs 5 and 6, app A). Vibration levels recorded during this evaluation were low and had no effect on safety of flight. No PIO tendencies were noted during the evaluation. One deficiency and one shortcoming were noted during the evaluation which were the result of the change in aircraft gross weight and center of gravity (cg) because of the GPS installation. The deficiency was insufficient longitudinal control margin. The shortcoming was insufficient directional control margin.

VIBRATION CHARACTERISTICS

8. Vibration characteristics were evaluated throughout the test program. Particular emphasis was placed on evaluating the data recorded during hover, low-speed, climb, cruise, and maneuvering flight. Tests were conducted at the conditions listed in table 1. Vibration data were sensed by four triaxial accelerometers, one biaxial accelerometer, and two uniaxial accelerometers for the ten flight conditions presented. Transducer locations are shown in appendix B.

9. Due to the heavy internal load, the aircraft was tested only at heavy gross weight at a forward cg in the clean, doors-on configuration. Figures 1 through 80, appendix E, indicate that vibration amplitudes were low at all transducer locations during ground runs (at ground- and flight-idle), hover, and low-speed flight. Generally, the highest vibration levels recorded were those of the transmission, with the 4-per-rotor-revolution (4/rev) frequency being the highest (0.145g). The vibration levels of the main pallet and power converter chassis of the main pallet were generally less than 0.05g at all frequencies analyzed. There were no ground resonance tendencies noted during the evaluation.

10. Figures 81 through 128, appendix E, indicate that vibrations at all transducer locations during flights at 90 and 110 knots calibrated airspeed (KCAS) and maximum power climb at 80 KCAS were generally higher than those of the low-speed flight envelope, but still relatively low. The maximum vibrations encountered were those recorded from the transmission-located transducers. The maximum vibration recorded was 0.258g at 2/rev in the lateral axis.

11. Figures 129 through 160, appendix E, indicate that vibrations at all transducer locations during right and left 2g turns were higher than any other condition tested, but overall levels were less than 0.4g and much less than the maximum design level of the prototype GPS (1.5g). The highest vibrations recorded for the main pallet and power converter chassis were 0.145 and 0.150g for the longitudinal and

lateral axes, respectively. The vibrations of the main pallet and power converter chassis of the GPS installed equipment appear to be low and well below the GPS design level of 1.5g. Within the scope of this test, the vibration characteristics of the NUH-1H helicopter with GPS installed met the requirements of paragraph 3.7 of military specification MIL-H-8501A (ref 7, app A).

HANDLING QUALITIES

Pilot-Induced Oscillation Characteristics

12. Oscillatory control inputs of various amplitudes and frequencies were performed in a hover and at 90 KCAS to simulate PIO. All oscillations of the pallets were convergent and upon removal of the excitation were rapidly damped to the normal flight level. There appeared to be no condition where the natural frequency of the pallet was excited from either normal aircraft vibrations or PIO.

Low-Speed Flight Characteristics

Longitudinal Control Margin:

13. Tests were conducted by stabilizing in forward and rearward flight at airspeeds from zero to 35 KTAS in 5-knot increments by reference to a calibrated pace vehicle. At zero airspeed (hover over a fixed point) there were 4.64 inches of aft longitudinal control remaining (36 percent of total longitudinal control travel). At 10 KTAS in rearward flight, the aft longitudinal control margin was reduced to 2.19 inches (17 percent of total longitudinal control travel). At 13 KTAS in rearward flight, the longitudinal control was against the aft stop (zero control margin). A plot of control positions versus airspeed is presented in figure 161, appendix E. The insufficient aft longitudinal control margin at the test cg and weight greatly reduces the downwind hover capability of the NUH-1H. The test weight and cg are within the approved flight envelope of the UH-1H. This finding reflects a deficiency in the basic UH-1H approved flight envelope. This deficiency was previously reported in references 5 and 6, appendix A. Downwind hover should not be conducted in winds greater than 10 knots with GPS installed. The insufficient aft longitudinal control margin in rearward flight above 10 KTAS is a deficiency.

14. The UH-1H operator's manual does not warn the pilot that at forward cg and heavy gross weight combinations insufficient aft longitudinal control may exist. The operator's manual presently limits the pilot to a rearward airspeed of 30 knots or less. The following WARNING should be incorporated in the operator's manual.

WARNING

At heavy gross weights with forward cg locations while hovering downwind, loss of aft longitudinal control may be experienced with winds greater than 10 knots.

Directional Control Margin:

15. In hover at zero wind conditions, left directional control margin was approximately 20 percent. At airspeeds less than translational lift airspeed (approximately 15 knots), left directional control margin was reduced even further. In a low-speed flight condition such as nap-of-the-earth flight, should a rapid right yaw rate be generated, there may be insufficient left pedal to stop the yaw. Additionally, with rapid power applications in hover or low-speed flight, directional control margin may be reduced to zero. For safety of flight, the NUH-1H helicopter with GPS installed should be restricted from rapid pedal turns to the right and from rapid power applications in hover or low-speed flight. The insufficient left pedal margin in low-speed flight is a shortcoming.

CONCLUSIONS

GENERAL

16. The following conclusions were reached upon completion of the evaluation:

- a. There were no ground resonance tendencies with the GPS installation (para 10).
- b. The vibrations of the main pallet and power converter chassis of the prototype GPS equipment were low and well below the design level of 1.5g and did not significantly amplify or affect the helicopter inherent vibrations (para 11).
- c. There were no PIO tendencies as a result of the GPS installation (para 12).
- d. One deficiency and one shortcoming were noted.

DEFICIENCY

17. The deficiency identified was insufficient aft longitudinal control margin in rearward flight above 10 KTAS (para 13).

SHORTCOMING

18. The shortcoming identified was insufficient left pedal margin in low-speed flight (para 15).

RECOMMENDATIONS

19. The following WARNING should be incorporated in the operator's manual (para 14):

WARNING

At heavy gross weights with forward cg locations while hovering downwind, loss of aft longitudinal control may be experienced with winds greater than 10 knots.

20. Incorporate the following restrictions in the safety-of-flight release for future NUH-1H prototype GPS tests:

- a. Downwind hover is limited to 10 knots of relative tail wind.
- b. Rapid right pedal turns will not be made.
- c. Rapid power applications will not be made in hover or in low-speed flight.

APPENDIX A. REFERENCES

1. Letter, AVSCOM, DRSAV-EQI, 15 December 1976, subject: UH-1H Global Positioning System (GPS) Flight Test Program, Project No. 76-13.
2. Technical Manual, TM 55-1520-210-10, *Operator's Manual, Army Model UH-1D/H Helicopter*, 25 August 1971.
3. Technical Manual, DDO1155, *Class II Modification Documentation, UH-1H Helicopter, Part II*, September 1976.
4. Letter, AVSCOM, DRSAV-EQI, 14 January 1977, subject: Safety-of-Flight Release for Global Positioning System (NAVSTAR), JUH-1H S/N 66-00869.
5. Final Report, US Army Aviation Systems Test Activity (USAASTA), Project No. 71-18, *Tail Rotor Performance and Translational Flight Handling Qualities Test, UH-1H Helicopter*, January 1972.
6. Final Report, USAASTA, Project No. 66-04, *Engineering Test, UH-1H Helicopter, Phase D (Limited)*, November 1970.
7. Military Specification, MIL-H-8501A, *Helicopter Flying and Ground Handling Qualities; General Requirements For*, 7 September 1961, with Amendment 1, 3 April 1962.

APPENDIX B. INSTRUMENTATION

GENERAL

1. Flight test instrumentation was installed, calibrated, and maintained by USAAEFA personnel. This instrumentation was used to record vibration data and flight condition parameters.

Pilot/Engineer Panel

2. Sensitive calibrated instrumentation was installed on the pilot/engineer panel to display the following parameters:

- Airspeed (ship's system)
- Altitude (ship's system)
- Rotor speed
- Normal cg acceleration
- Time encoding display
- Directional control position

Analog Magnetic Tape System

3. An FM-FM magnetic tape system was used to record flight control positions and vibration data. Vibration data were analyzed over a frequency range of zero to 100 Hz. The transducers were triaxial, biaxial, and uniaxial linear accelerometers which were mounted at seven locations for a total of 16 channels of vibration data. The accelerometers were bonded to the component of interest with the accelerometer axis aligned with the aircraft axis. The main pallet accelerometer locations are shown in figure 1. Control positions and accelerometer locations are listed below.

Control position:

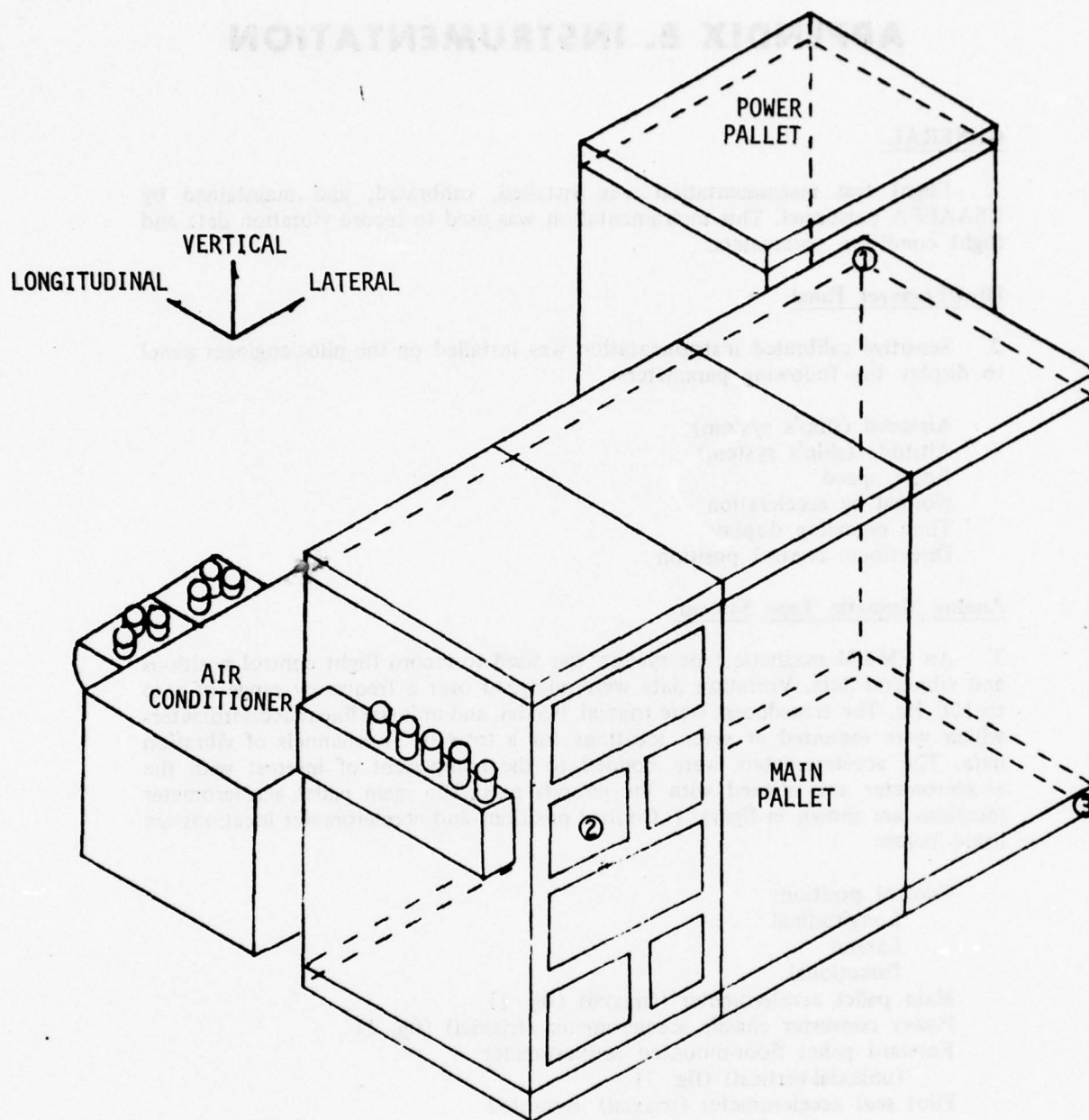
- Longitudinal
- Lateral
- Directional

Main pallet accelerometer (triaxial) (fig. 1)

Power converter chassis accelerometer (triaxial) (fig. 1)

Forward pallet floor-mounted accelerometer
(uniaxial-vertical) (fig. 1)

Pilot seat accelerometer (triaxial), mounted
on aircraft floor under pilot seat



LOCATION

- 1 MAIN PALLET TRIAXIAL ACCELEROMETER
- 2 POWER CONVERTER CHASSIS TRIAXIAL ACCELEROMETER
- 3 FORWARD FLOOR MOUNTED UNIAXIAL (VERTICAL) ACCELEROMETER

Figure 1. Accelerometer Location - Main Pallet.

Transmission (triaxial), mounted on upper
forward transmission housing
Cyclic (biaxial-longitudinal and lateral), mounted
on pilot cyclic control
Collective (uniaxial-vertical), mounted on
pilot collective control

APPENDIX C. PHOTOGRAPHS

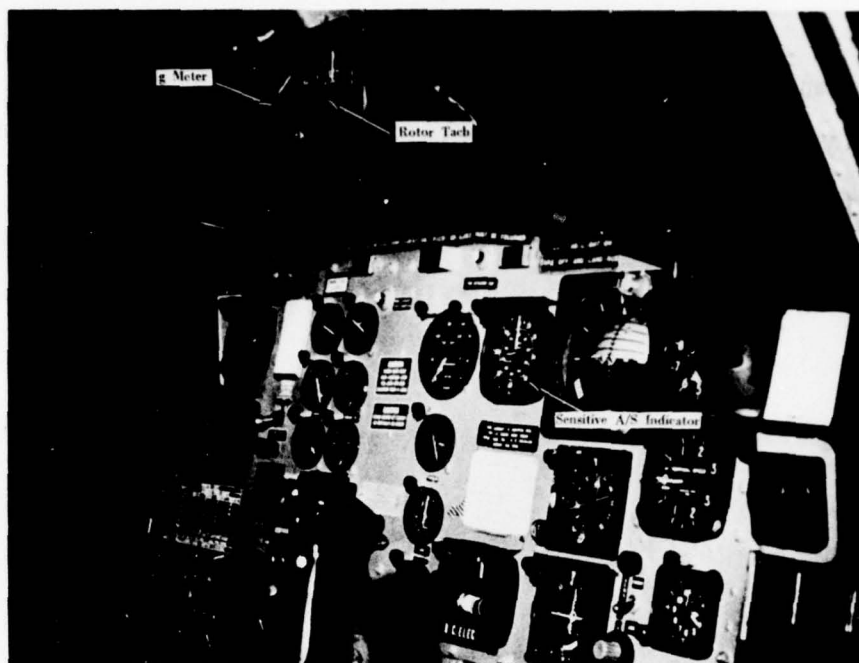


Photo 1. Test Aircraft Cockpit.

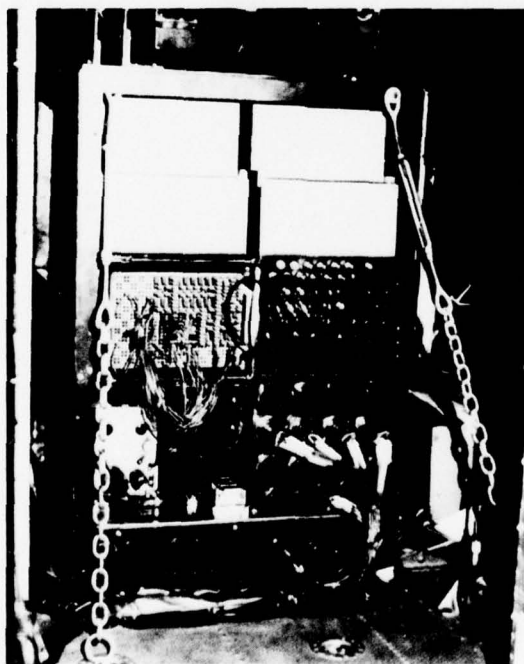


Photo 2. Right-Side View, FM-FM Magnetic Tape System.

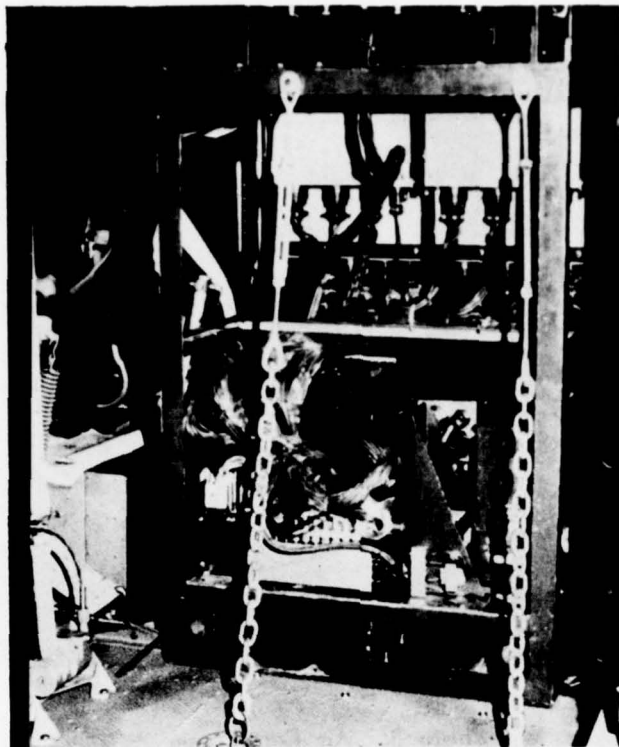


Photo 3. Left-Side View, FM-FM Magnetic Tape System.

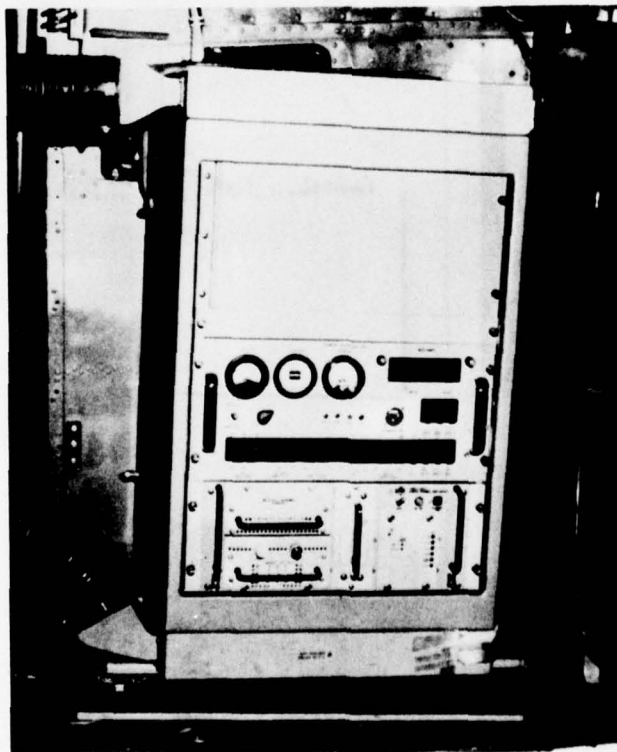


Photo 4. Power Converter Pallet.

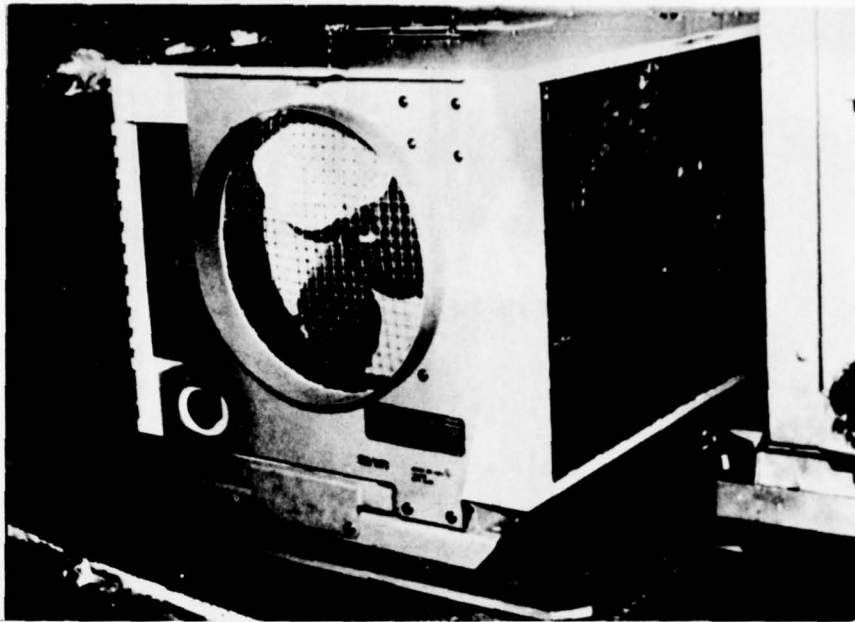


Photo 5. Air Conditioner Pallet.

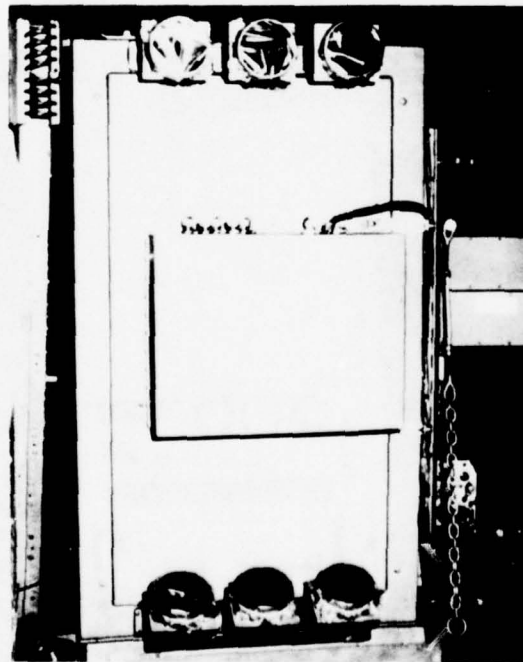


Photo 6. Main Pallet Right-Side View.

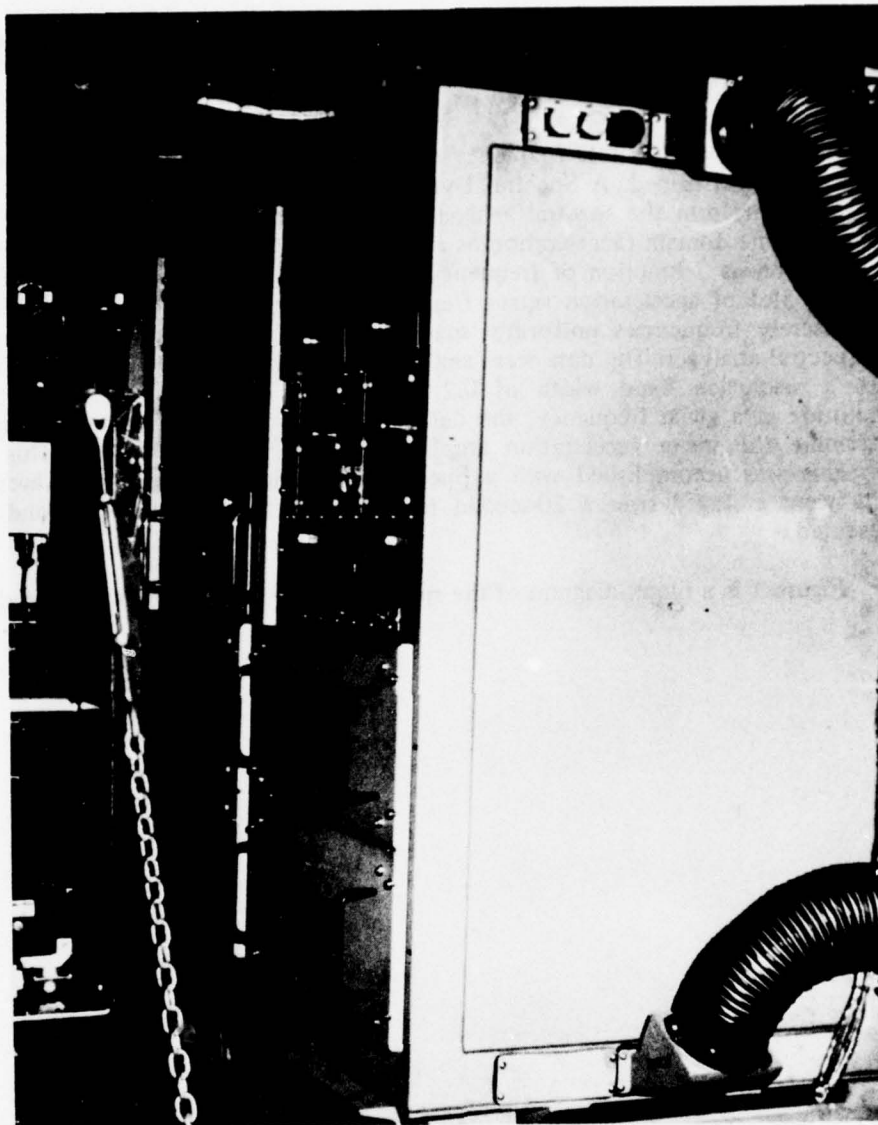


Photo 7. Main Pallet Left-Side View.

APPENDIX D. DATA ANALYSIS METHODS

1. Because of the discrete frequency content of the data, a narrow-band spectral analysis was performed. A Spectral Dynamics 301 real time spectral analyzer was utilized to perform the spectral analysis. This spectral analysis converted the data from the time domain (acceleration as a function of time) to the frequency domain (acceleration as a function of frequency). The output of the spectral analysis was a digital plot of acceleration versus frequency composed of acceleration values at 500 discrete frequencies uniformly spaced over the selected frequency range of the spectral analyzer. The data were analyzed on the zero- to 100-Hz analysis range with a resolution band width of 0.2 Hz. Because of the random variation in amplitude at a given frequency, the data were averaged over a period of time to determine the mean acceleration amplitude for each test condition. This data averaging was accomplished with a Spectral Dynamics 302B ensemble averager. Data were averaged over a 20-second time interval for all the flight conditions presented.

2. Figure 1 is a block diagram of the spectral analysis data processing procedures.

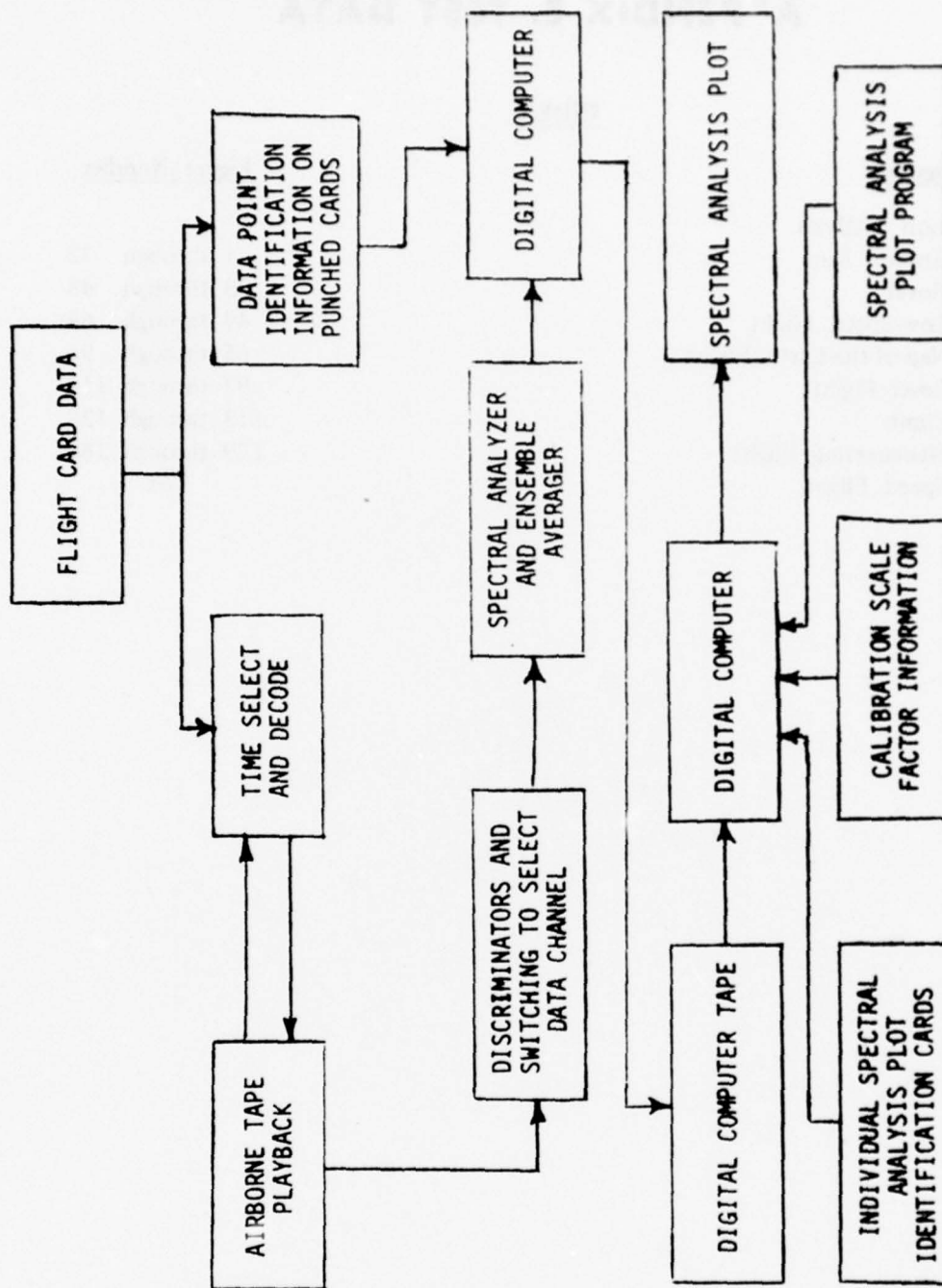


Figure 1. Vibration Data Spectral Analysis Procedure.

APPENDIX E. TEST DATA

INDEX

<u>Figure</u>	<u>Figure Number</u>
Vibration Analysis	
Ground Run	1 through 32
Hover	33 through 48
Low-Speed Flight	49 through 64
Nap-of-the-Earth Flight	65 through 96
Level Flight	97 through 112
Climb	113 through 128
Maneuvering Flight	129 through 160
Low-Speed Flight	161

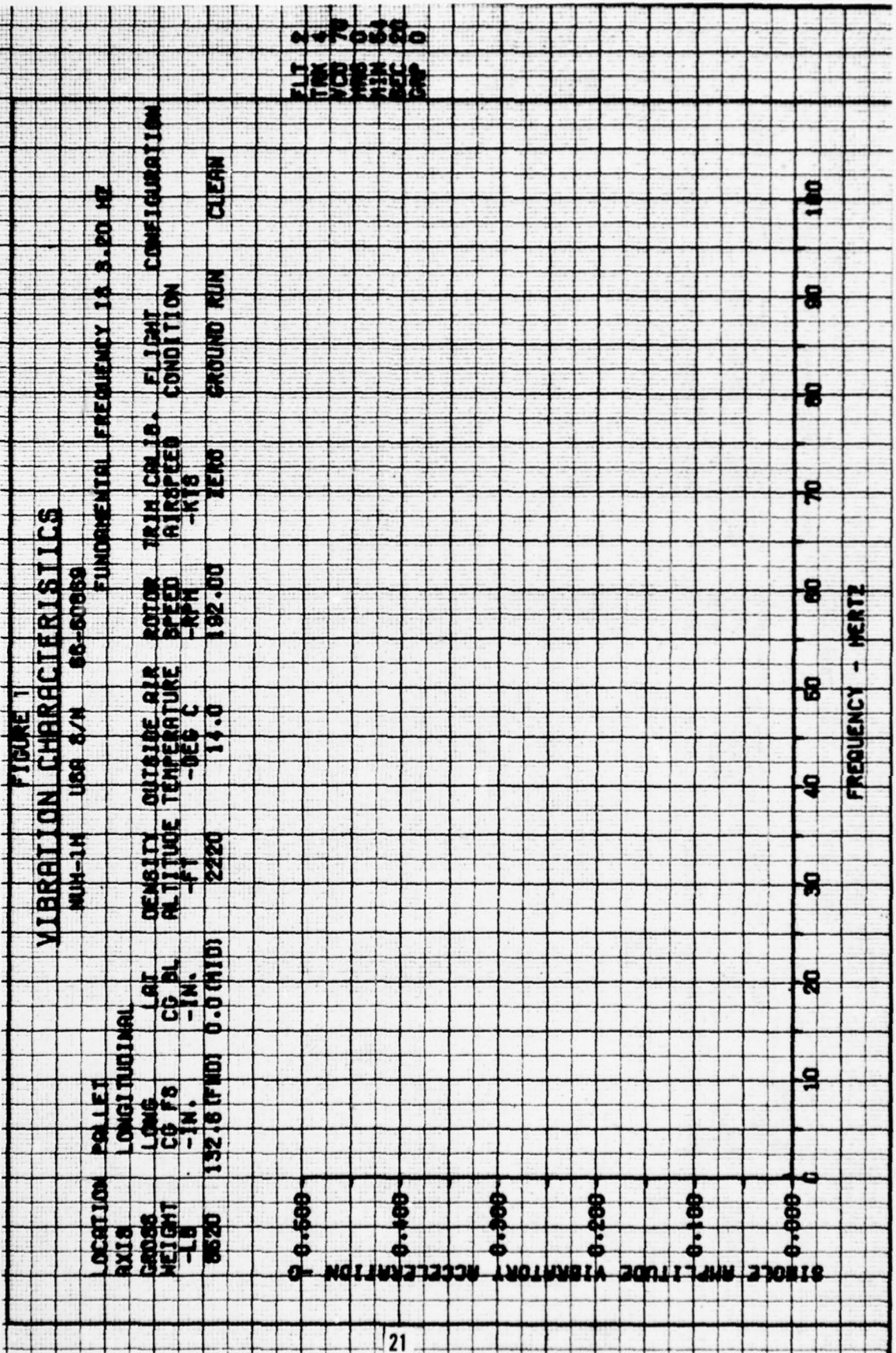


FIGURE 2

VIBRATION CHARACTERISTICS

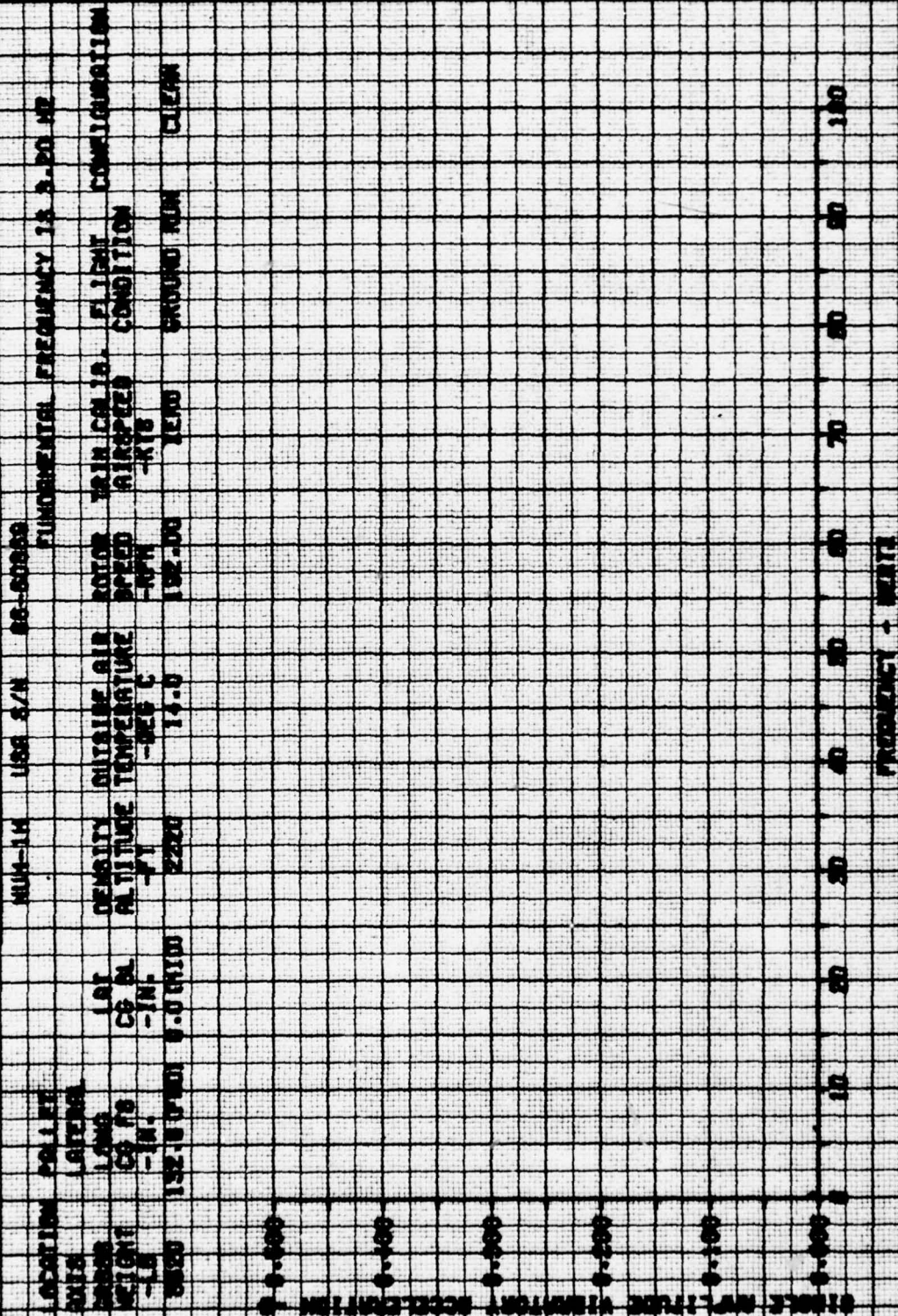


FIGURE 4

VIBRATION CHARACTERISTICS

LOCATION	PILOT SEAT	NUM-14	108 S/N	68-60869	FUNDAMENTAL FREQUENCY IS 3.20 HZ
AXIS	LONGITUDINAL	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.
WEIGHT	LONG	ALTITUDE	TEMPERATURE	SPEED	FLIGHT
-LB	CG F'S	-FT	-DEG C	-RPM	CONDITION
8520	132.6 (PMO)	2220	14.0	192.00	-K18
	0.0 (HYD)				
				ZERO	GROUND RUN
					CLEAN

FLT 2
TRK 5
VCO 25
VMS 0
MIN 64
SEC 20
CRP 0

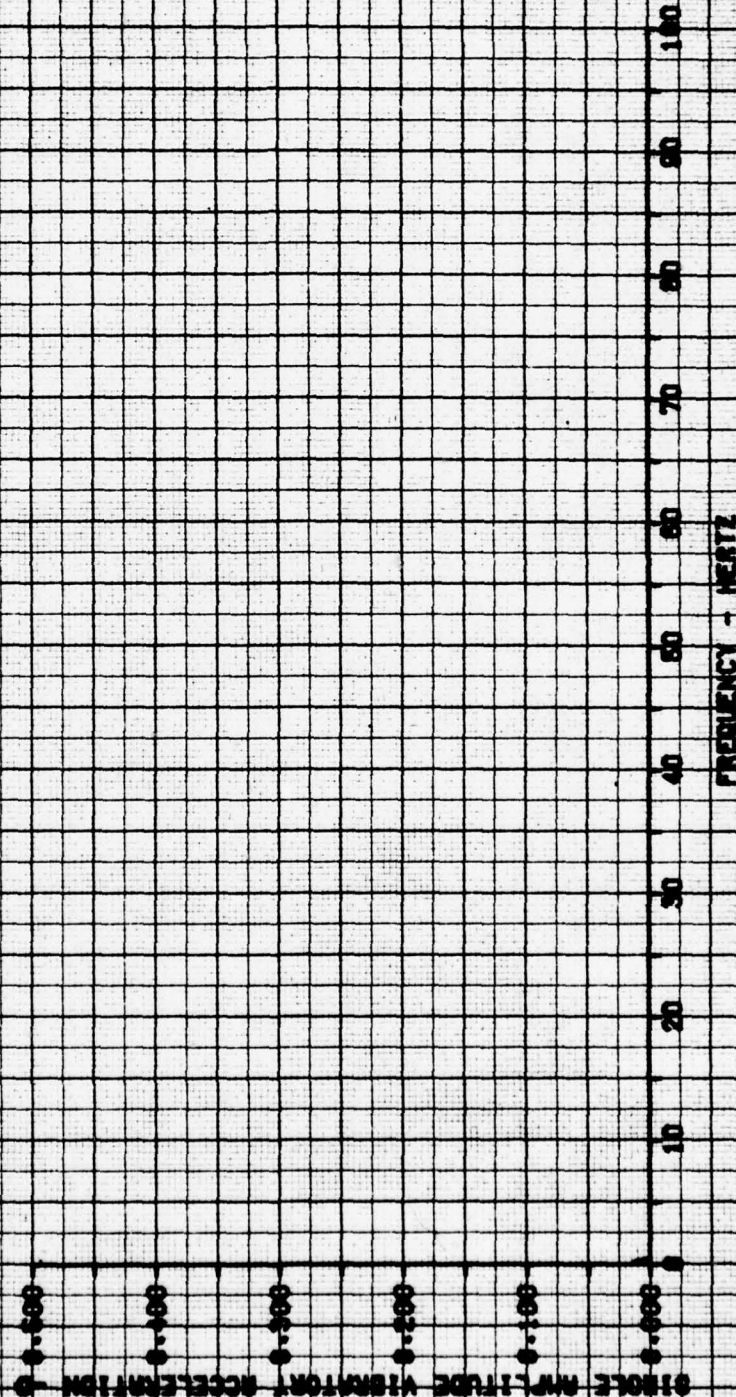


FIGURE 3

VIBRATION CHARACTERISTICS

NUH-1H USA 8/A 66-60869

FUNDAMENTAL FREQUENCY IS 3.20 Hz

LOCATION PILOT SEAT

AXIS LATERAL

WEIGHT 8520

CG F/S 132.8 (FWO)

-IN. 0.0 (HID)

DENSITY 2220

ALTITUDE -FT

14.0

OUTSIDE AIR ROTOR

SPEED -RPM 192.00

ZERO

FLIGHT COMBINATION

AIRSPED CONDITION

-KTS

GROUND RUN CLEAN

0.500

0.100

0.300

0.200

0.100

0.000

SINGLE AMPITUDE VIBRATION ACCELERATION

FREQUENCY - HERTZ

100

90

80

70

60

50

40

30

20

10

FLT 2
ITEM 6
VCS 48
WCS 0
HIM 64
HIC 28
MCP 0

FIGURE 6

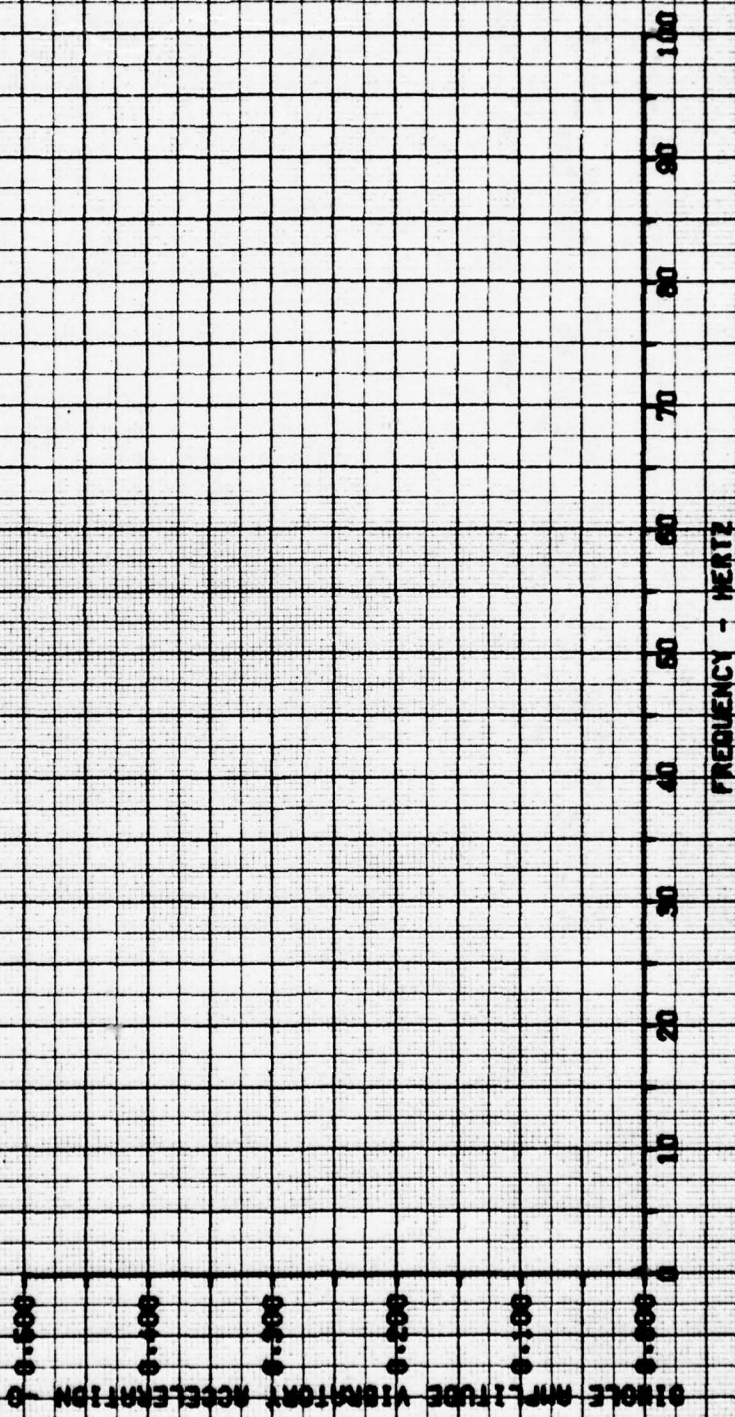
VIBRATION CHARACTERISTICS

MU4-1M USA 2/M 66-60869 FUNDAMENTAL FREQUENCY 18 3.20 HZ

LOCATION PALET
 AXIS VERTICAL
 CROSS LONG
 WEIGHT CG #8
 -LB 132.8 (PM) 0.0 (MID)

DENSITY OUTSIDE AIR ROTOR TRIM CALIB. FLIGHT CONFIGURATION
 ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION
 -FT -DEG C -RPM -KTS
 2220 14.0 192.00 ZERO GROUND RUN CLEAN

FLT 2
 FRK 5
 VCS 55
 HCS 0
 MIN 54
 REC 20
 END 0



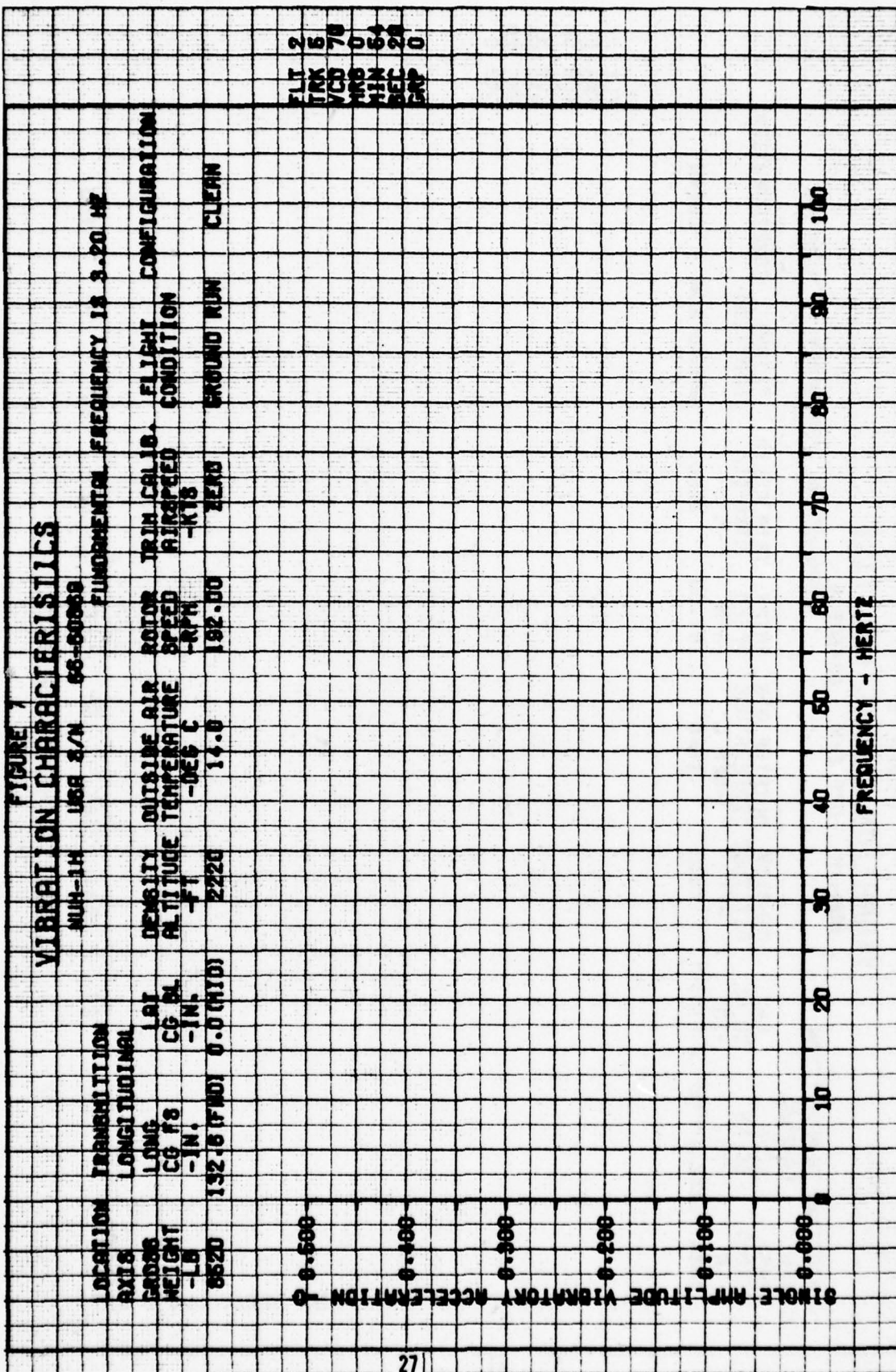


FIGURE 8

VIBRATION CHARACTERISTICS

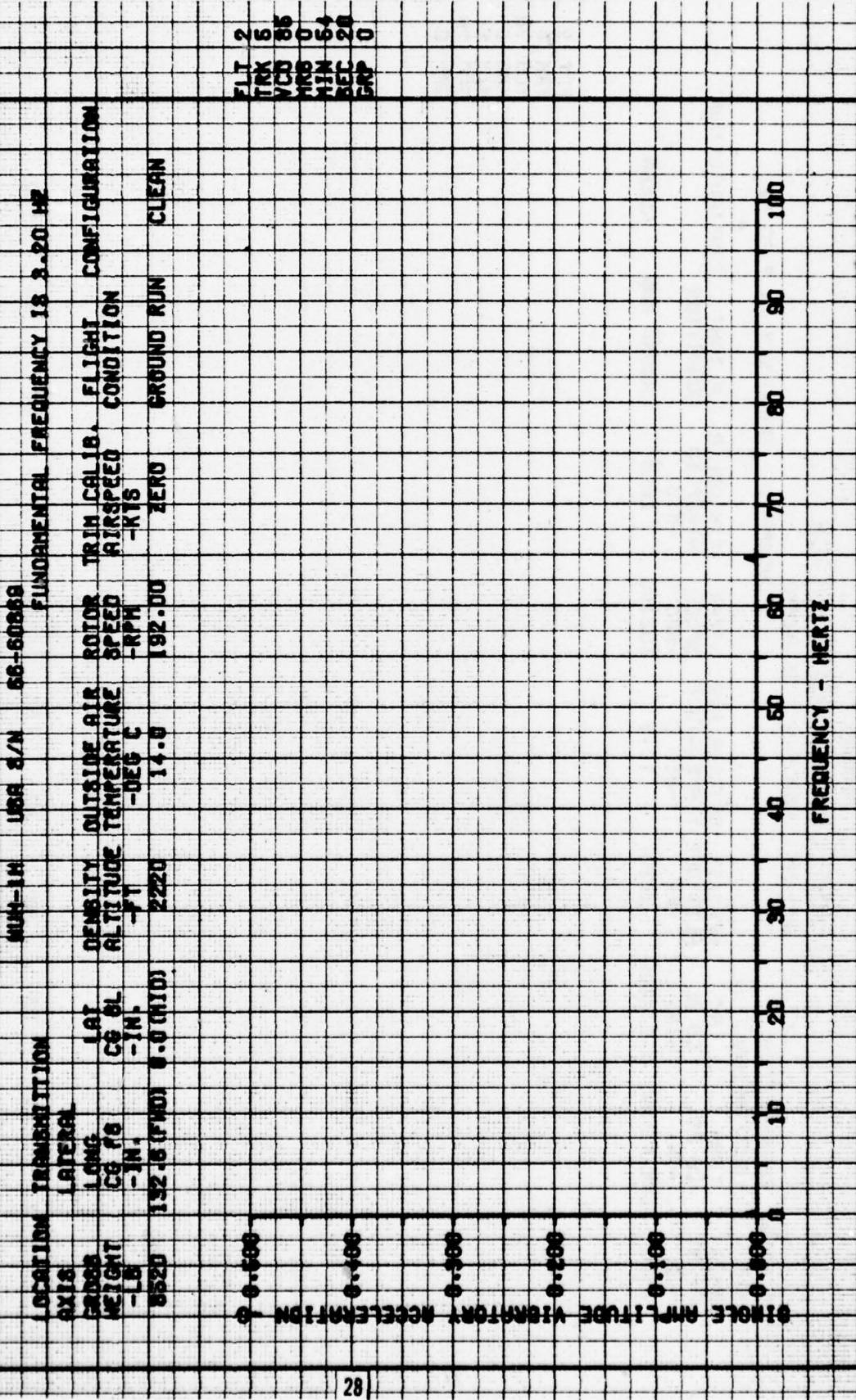


FIGURE 9

VIBRATION CHARACTERISTICS

LOCATION TRANSMISSION
 AXIS VERTICAL
 GROSS LONG
 HEIGHT CG FS
 -LB -IN.
 8520 132.6 (FWD) 0.0 (HTD)

NUH-1H USA 8/N 66-60869
 FUNDAMENTAL FREQUENCY IS 3.20 ME

DENSITY OUTSIDE AIR ROTOR TRIM CALIB. FLIGHT CONFIGURATION
 ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION
 -FT -DEG C -RPM -KTS
 2220 14.0 192.00 ZERO GROUND RUN CLEAN

SINGLE AMPLITUDE VIBRATION ACCELERATION
 0.500
 0.400
 0.300
 0.200
 0.100
 0.000

FREQUENCY - HERTZ

100

90

80

70

60

50

40

30

20

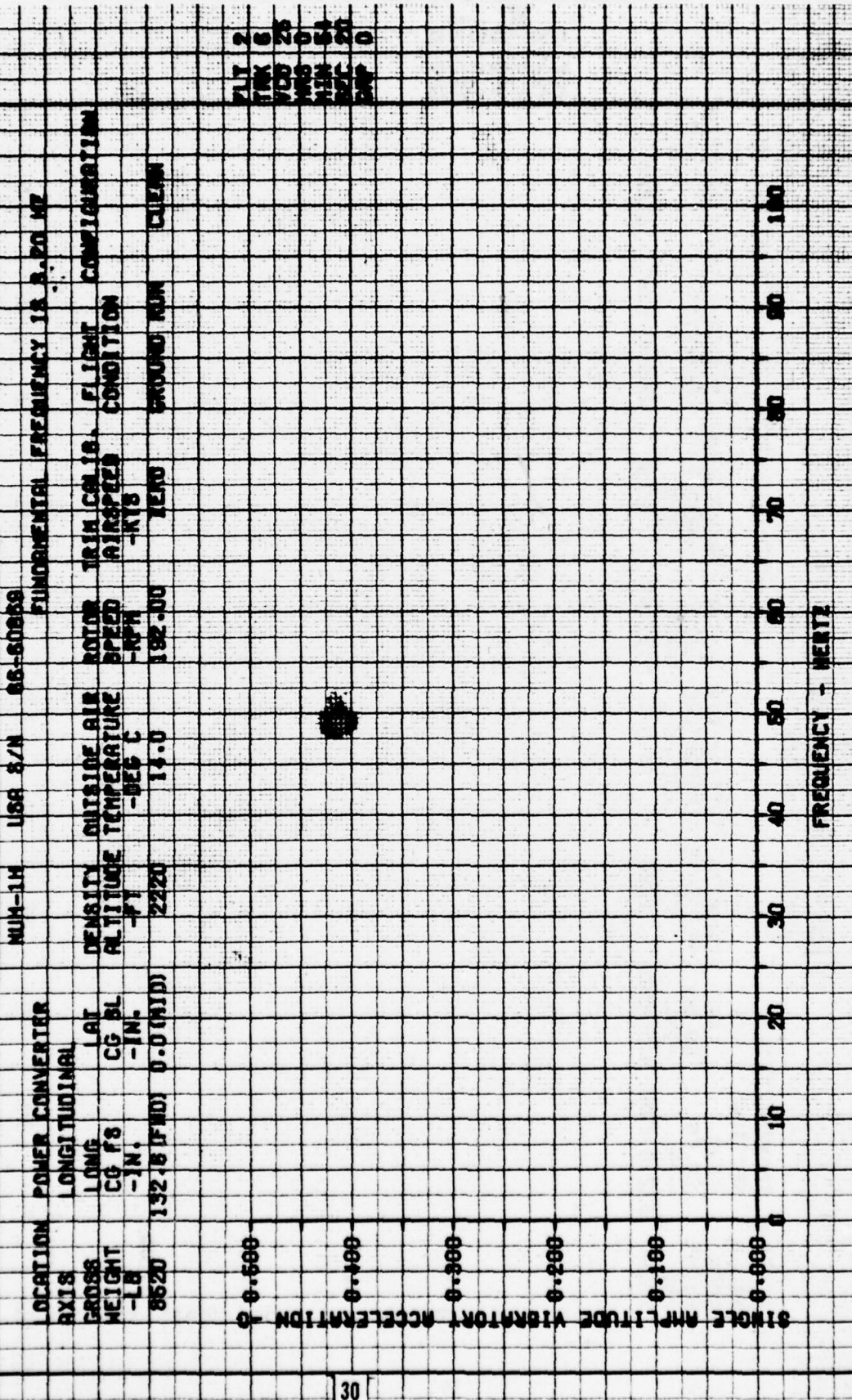
10

0

FLT 2
 TRK 6
 VCS 100
 MAG 0
 MIN 64
 DEL 20
 SPS 0

FIGURE 10

VIBRATION CHARACTERISTICS



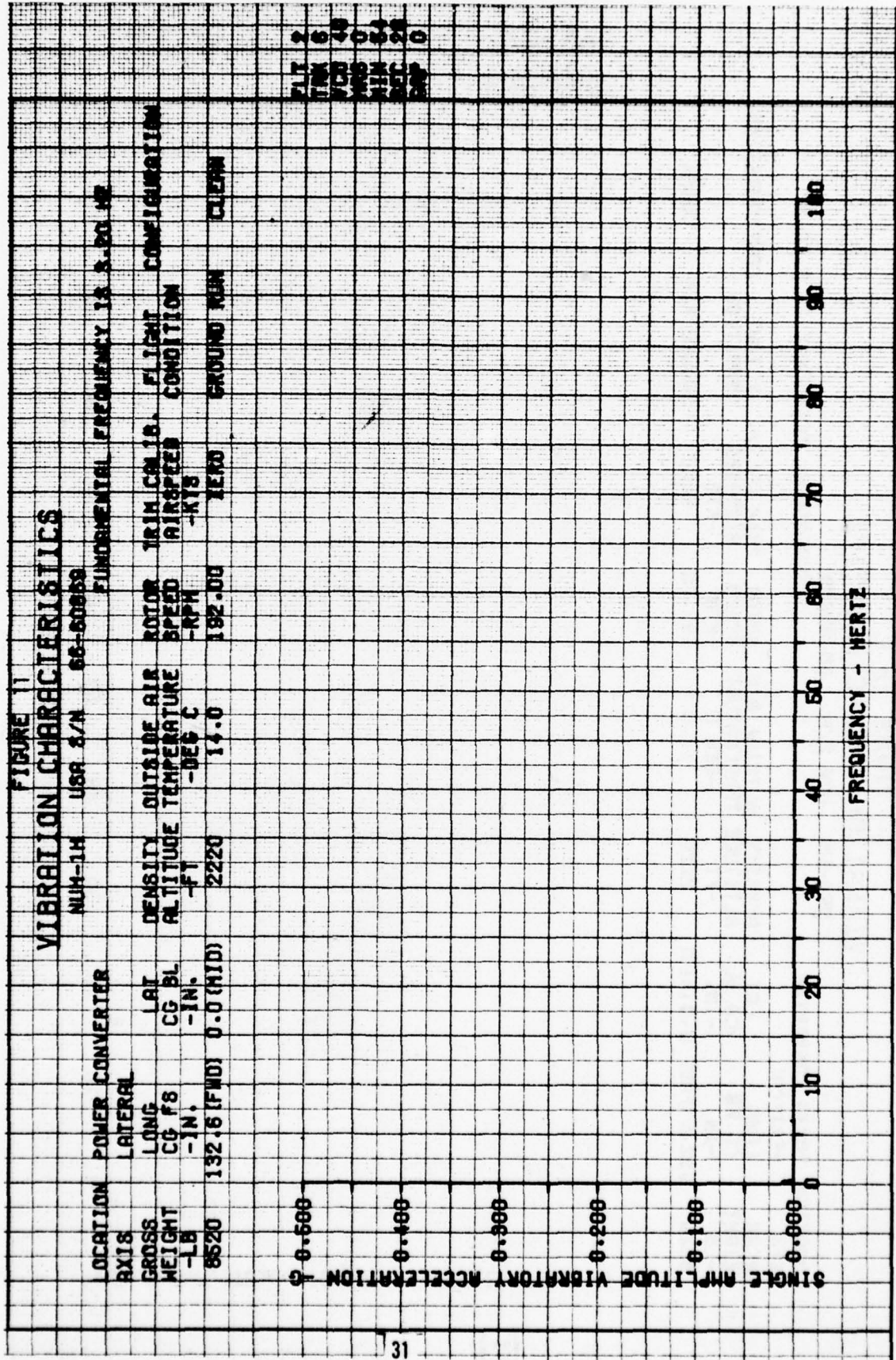


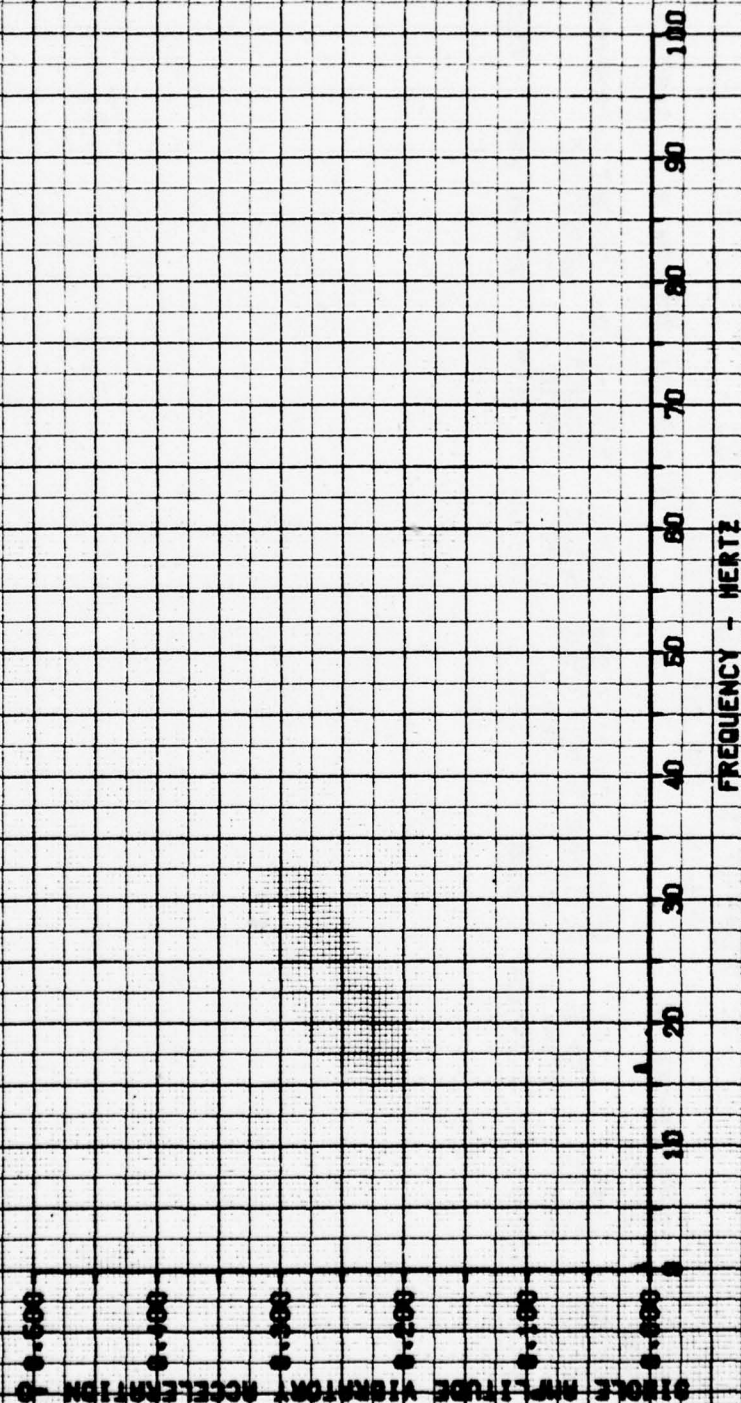
FIGURE 12

VIBRATION CHARACTERISTICS

LOCATION	POWER CONVERTER	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.	FLIGHT	CONFIGURATION
AXIS	VERTICAL	ALTITUDE	TEMPERATURE	SPEED	AIR SPEED	CONDITION	
38000	LONG	-FT	-DEG C	-RPM	-KTS		
WEIGHT	CG AS						
-LB	-IN.						
3520	132.5 (PMO) 0.0 (HID)	2220	14.0	192.00	ZERO	GROUND RUN	CLEAN

FUNDAMENTAL FREQUENCY IS 3.20 HZ

FLT 2
TRK 6
VCO 56
MRS 0
MIN 54
SEC 20
GRP 0



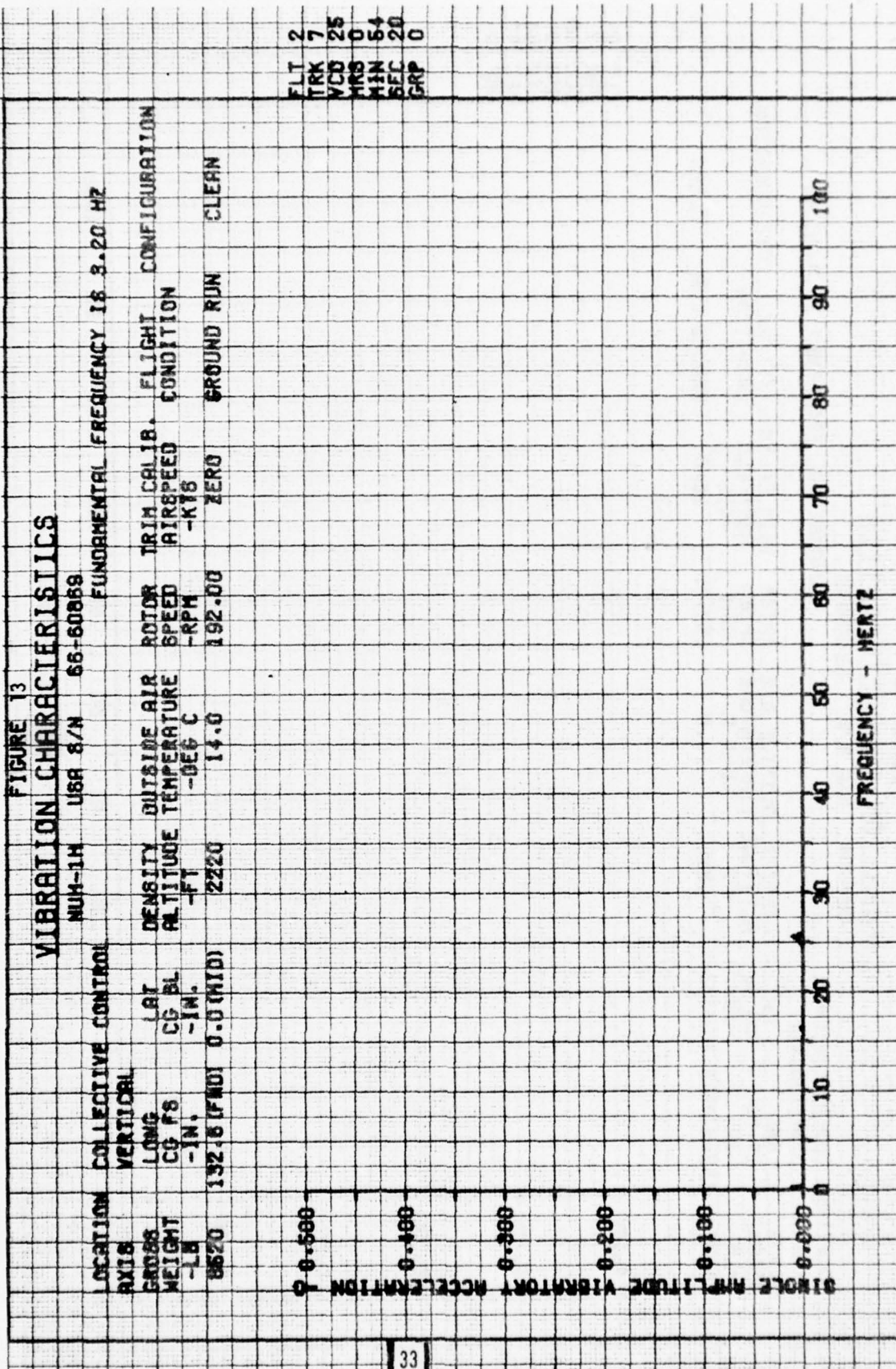


FIGURE 14

VIBRATION CHARACTERISTICS

LOCATION	CYCLIC CONTROL	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.	FLIGHT	CONFIGURATION
AXIS	LONGITUDINAL	ALTITUDE	TEMPERATURE	SPEED	AIR SPEED	CONDITION	
FACTOR	LONG	-FT	-DEG C	-RPM	-KTS		
WEIGHT	CG F3	CG BL					
-LB	-IN.	-IN.					
3520	132.5 (FWD)	0.0 (MID)	14.0	192.03	ZERO	GROUND RUN	CLEAN

FLT 2
TRK 7
VCO 40
HRS 0
MIN 54
SEC 20
DOP 0

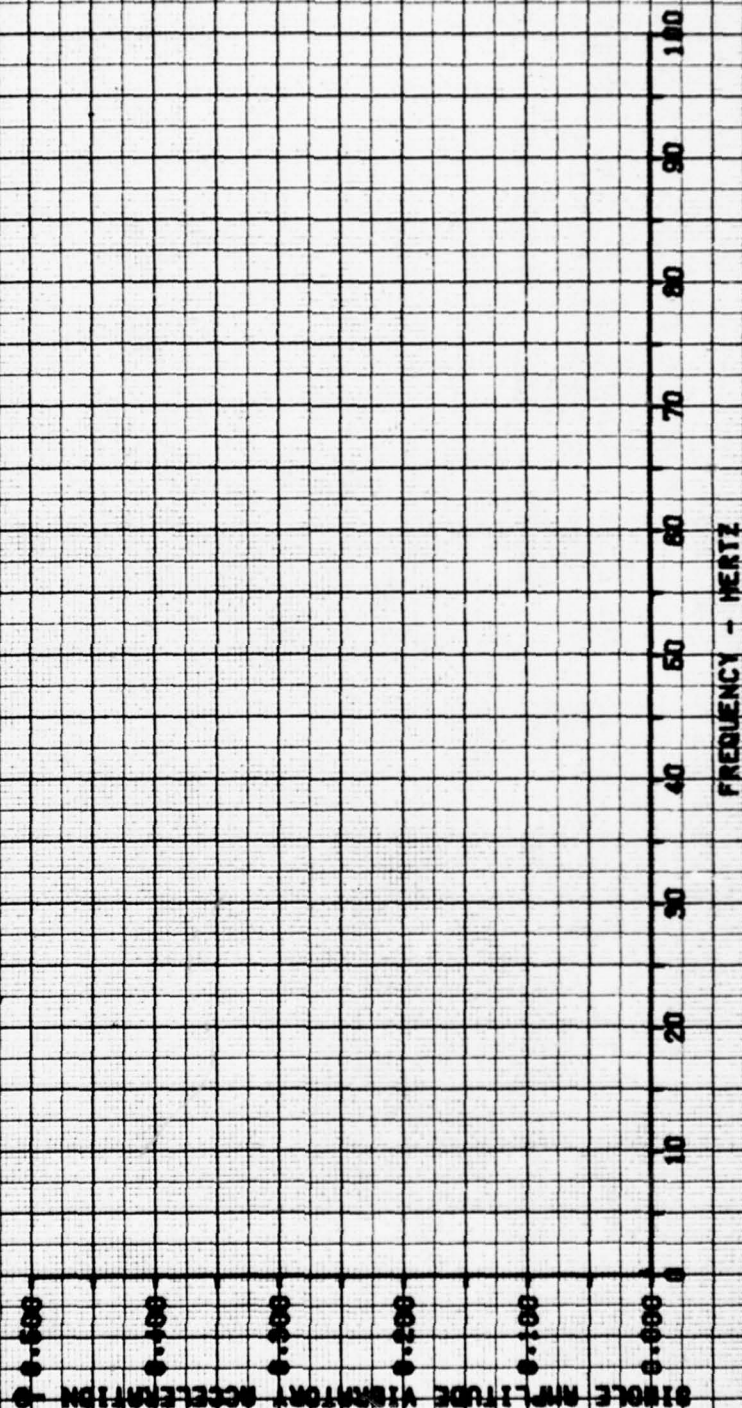


FIGURE 15

VIBRATION CHARACTERISTICS

LOCATION	CYCLIC CONTROL	NUM-14	USA S/N	66-60869	FUNDAMENTAL FREQUENCY IS 3.20 HZ
AXIS	LATERAL				
GROSS WEIGHT	LONG	DENSITY	OUTSIDE AIR	ROTOR TRIM CAL IS	FLIGHT CONFIGURATION
-LB	CG F3	ALTITUDE	TEMPERATURE	SPEED	AIR SPEED CONDITION
8520	-IN.	-FT	-DEG C	-RPM	-KTS
	132.6 (FWD)	2220	14.0	192.00	ZERO
	0.0 (HID)				GROUND RUN
					CLEAN

FLT 2
TRK 7
VCS 66
WTS 0
HIN 84
SEC 20
CAP 0

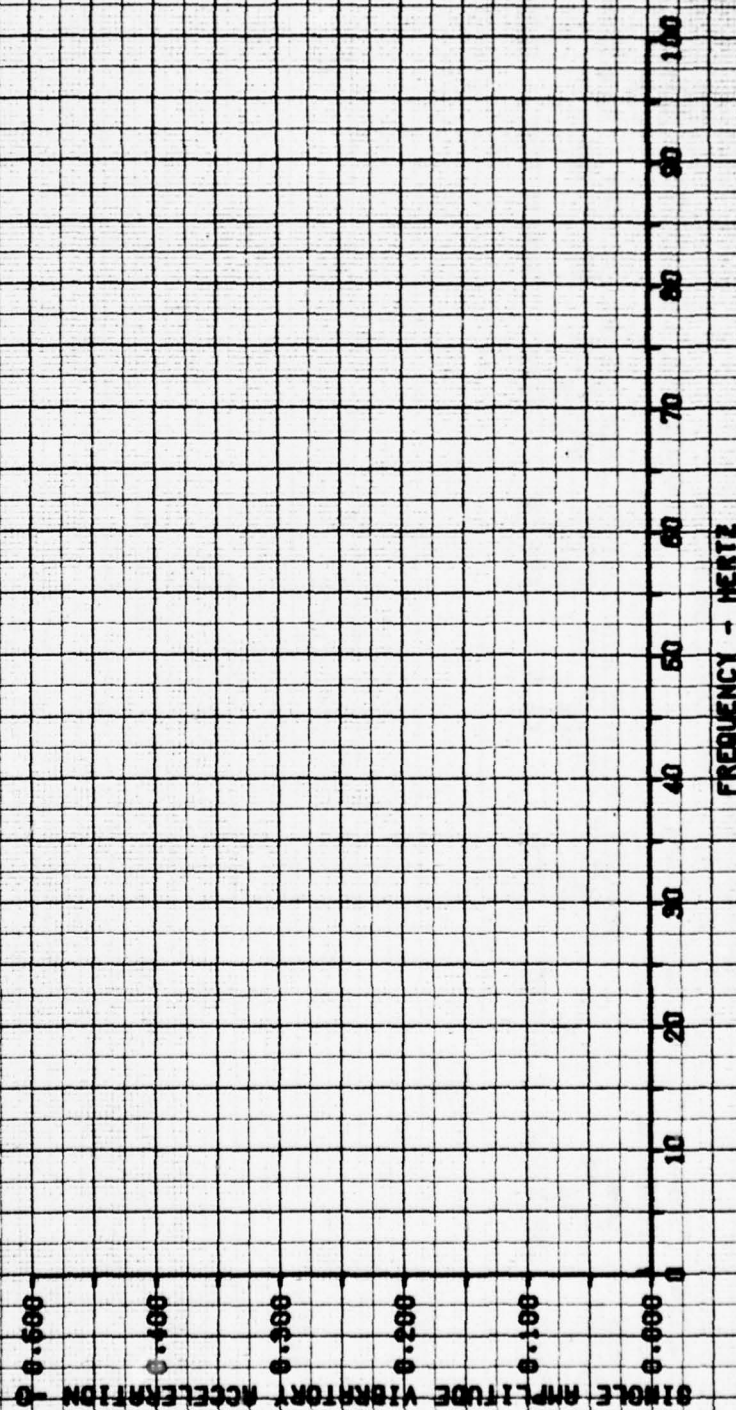


FIGURE 16

VIBRATION CHARACTERISTICS

LOCATION FORWARD PALLET FLOOR MOUNT
 AXIS VERTICAL
 DIM-14 USA 2/N 66-60869
 FUNDAMENTAL FREQUENCY IS 3.20 HZ
 ROTOR TRAIN CALIB. FLIGHT CONFIGURATION
 SPEED AIRSPEED CONDITION
 -RPM -KTS
 192.00 ZERO GROUND RUN CLEAR
 DENSITY OUTSIDE AIR
 ALTITUDE TEMPERATURE
 -FT -DEG C
 2220 14.0
 LAT CG BL
 -IN. -IN.
 132.8 (FWD) 8.0 (A100)

FLT 2
 FMA 7
 FCS 70
 AMS 0
 HIN 64
 SEC 28
 DOP 0

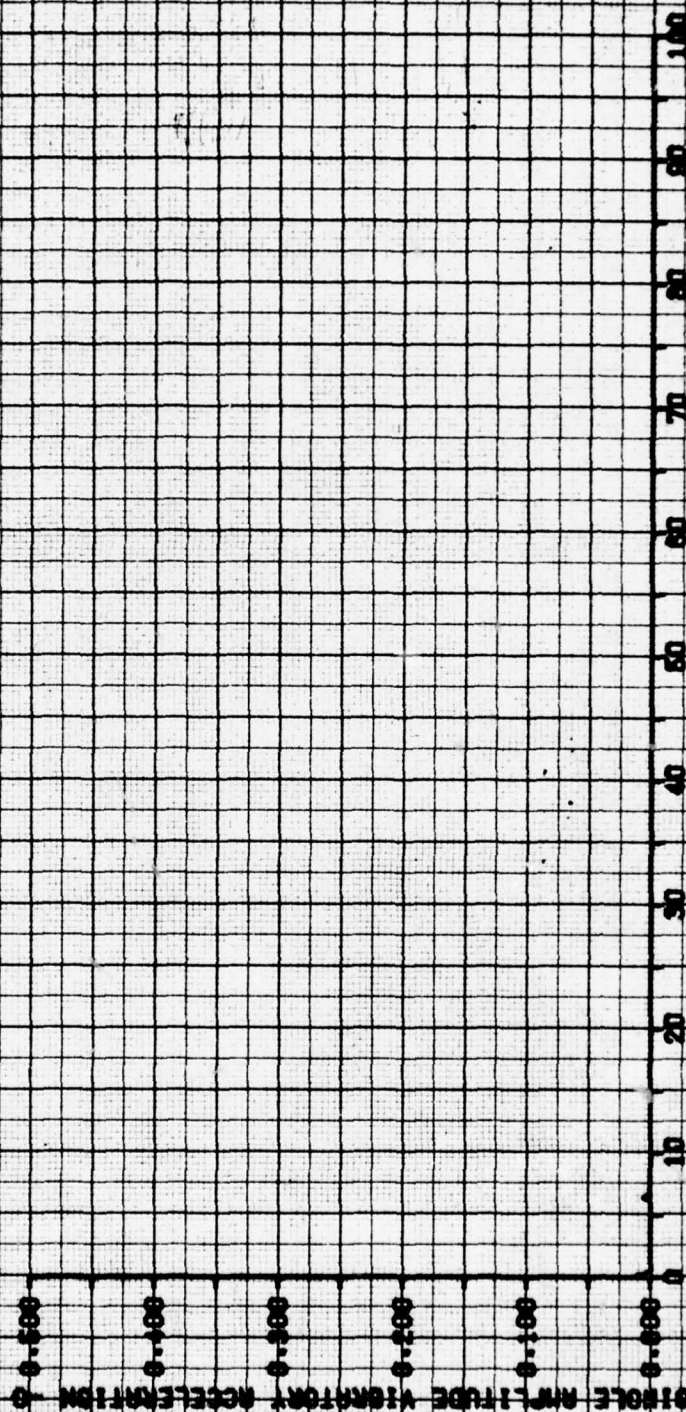


FIGURE 17 VIBRATION CHARACTERISTICS

MUH-1H USA S/N 86-60859
 LOCATION PALLET
 AXIS LONGITUDINAL
 CROSS LONG
 WEIGHT CG FS
 -LB -IN.
 3580 132.7 (FWD) 0.0 (MID)
 DENSITY OUTSIDE AIR ROTOR TRIM CALIB. FLIGHT CONFIGURATION
 ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION
 -FT -DEG C -RPM -KTS
 2220 14.0 324.0 ZERO GROUND RUN CLEAN
 FUNDAMENTAL FREQUENCY IS 5.40 HZ

FLT 2
 INK 4
 VCU 70
 HRS 0
 MIN 55
 SEC 35
 GWP 0

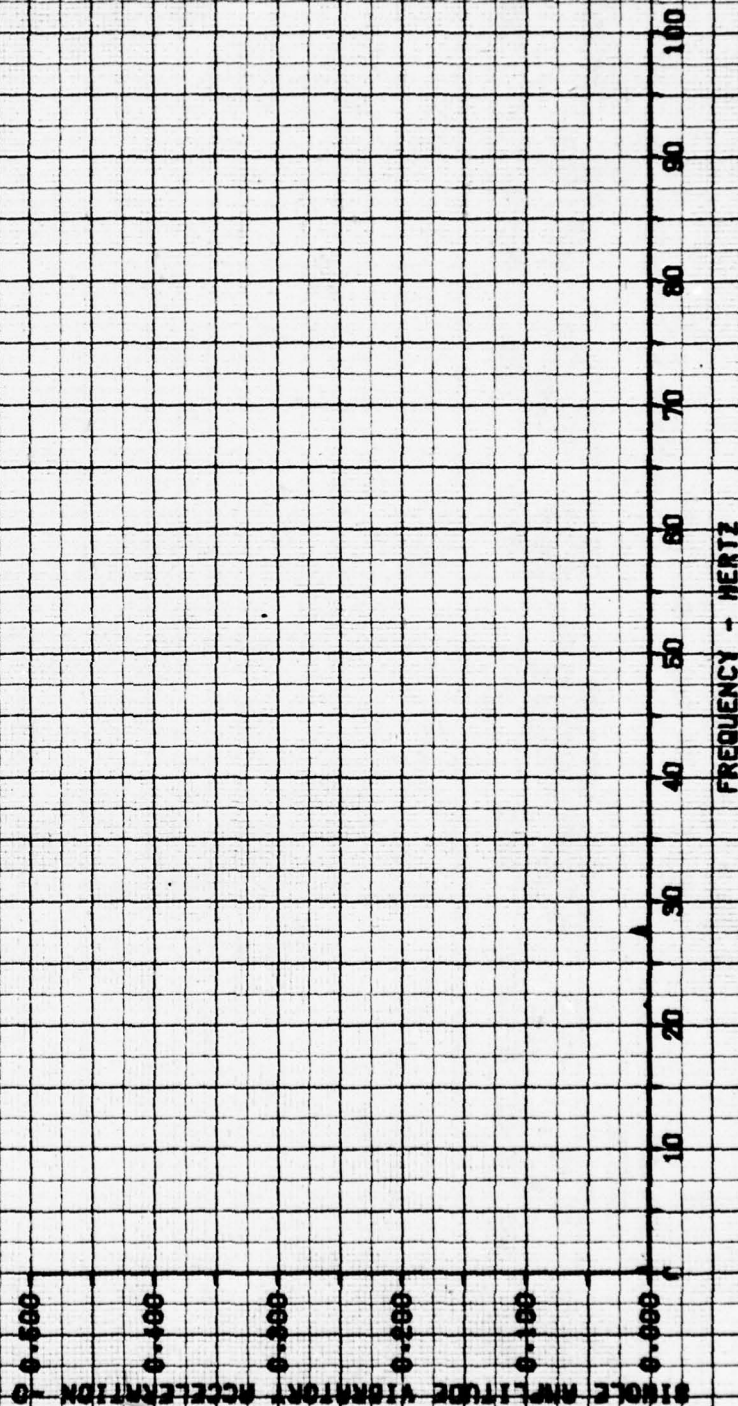


FIGURE 18

VIBRATION CHARACTERISTICS

NUH-1H USA S/N 86-60869

FUNDAMENTAL FREQUENCY IS 5.40 HZ

LOCATION PALLET
RX18 LATERAL

WEIGHT
-LB

132.7 (PMO)

0.0 (MIN)

2220

14.0

324.0

ZERO

GROUND RUN

CLEAN

0.0 (MIN)

0.0 (MIN)

0.0 (MIN)

0.0 (MIN)

0.0 (MIN)

0.0 (MIN)

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0.0 (MIN)

FLT 2
TRK 4
VCS 86
HRS 0
MIN 36
SEC 36
CRP 0

SINGLE AMPLITUDE VIBRATION ACCELERATION

FREQUENCY - HERTZ

FIGURE 19

VIBRATION CHARACTERISTICS

MUH-1H USA 2/N 88-80889

FUNDAMENTAL FREQUENCY IS 5.40 HZ

LOCATION PALLET

AXIS VERTICAL

CROSS

WEIGHT

-LB

8500

LONG

CO F'S

-IN.

132.7 (F401)

LAT

CO BL

-IN.

0.0 (M10)

DENSITY

OUTSIDE AIR

TEMPERATURE

-DEG C

14.0

ALTITUDE

-FT

2220

ROTOR

SPEED

-RPM

324.0

IRIM CALIB.

FLIGHT

CONDITION

-K18

AIR SPEED

GROUND RUN

CLEAN

ZERO

SINGLE AMPLITUDE VIBRATION ACCELERATION

0.500

0.400

0.300

0.200

0.100

0.000

FREQUENCY - HERTZ

100

80

60

40

20

10

0

FLT 2
TRK 4
VCS 100
MMS 0
MIN 35
DEC 35
END 0

FIGURE 20

VIBRATION CHARACTERISTICS

LOCATION PILOT SEAT
 AXIS LONGITUDINAL
 WEIGHT 300 LB
 CG FS 132.7 (IN)
 CG BL -IN.
 LAT 0.0 (IN)
 DENSITY 2220
 ALTITUDE 14.0
 TEMPERATURE -DEG C
 ROTOR SPEED 324.0
 TRIM CALIB. -KT8
 FLIGHT CONDITION ZERO
 GROUND RUN CLEAN

HUH-1H USA 2/N 66-60869
 FUNDAMENTAL FREQUENCY IS 5.40 HZ

FLT 2
 TRA 5
 VCD 26
 WRS 0
 MIN 36
 REC 36
 DRP 0

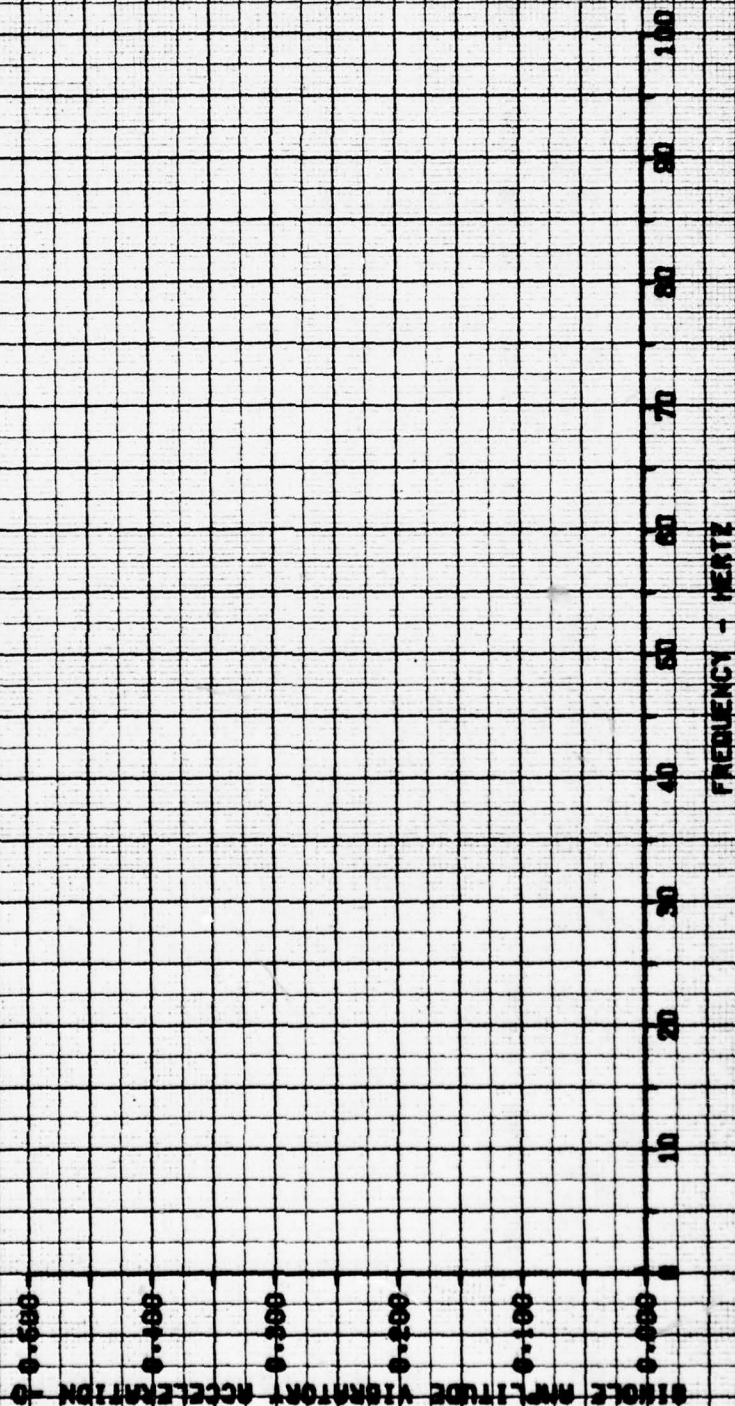


FIGURE 21

VIBRATION CHARACTERISTICS

LOCATION PILOT SEAT
 AXIS LATERAL
 GROSS WEIGHT 8580
 CG FTS 152.7 (FWOI)
 CG BL -IN. 0.0 (MID)
 LAY CO BL -IN. 0.0 (MID)
 DENSITY 2220
 ALTITUDE -FT 14.0
 OUTSIDE AIR TEMPERATURE -DEG C 324.0
 ROTOR SPEED -RPM ZERO
 TRIM CALIB. FLIGHT CONFIGURATION
 AIRSPEED -KTS GROUND RUN
 CLEAN

MUH-1H USA S/N 68-50862
 FUNDAMENTAL FREQUENCY IS 5.40 HZ

ZLT 2
 TANK 5
 VCO 40
 MAG 0
 MIN 36
 SEC 26
 SWP 0

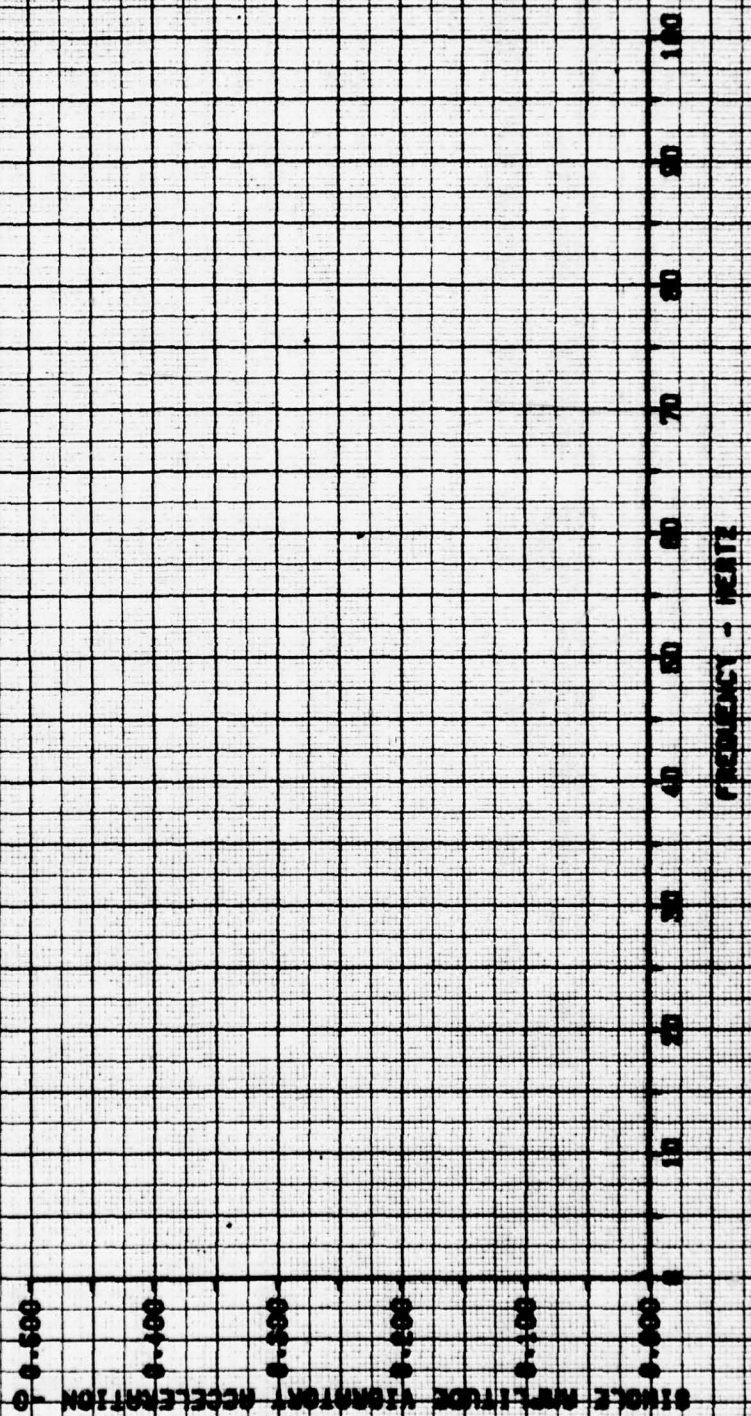


FIGURE 22

VIBRATION CHARACTERISTICS

LOCATION PILOT SEAT
 AXIS VERTICAL
 WEIGHT 132.7 LBS
 CG 18
 -IN.
 LAT 132.7 FT
 CG 18
 -IN.
 ALTITUDE 2220
 -FT
 DENSITY 0.0012
 OUTSIDE AIR SPEED 324.0
 -RPM
 TEMPERATURE 14.0
 -DEG C
 TRIM CALIB. ZERO
 FLIGHT CONDITION GROUND RUN
 CONFIGURATION CLEAN

FLT 2
 TRK 5
 VCU 55
 MAG 0
 MIN 55
 REL 35
 CAP 0

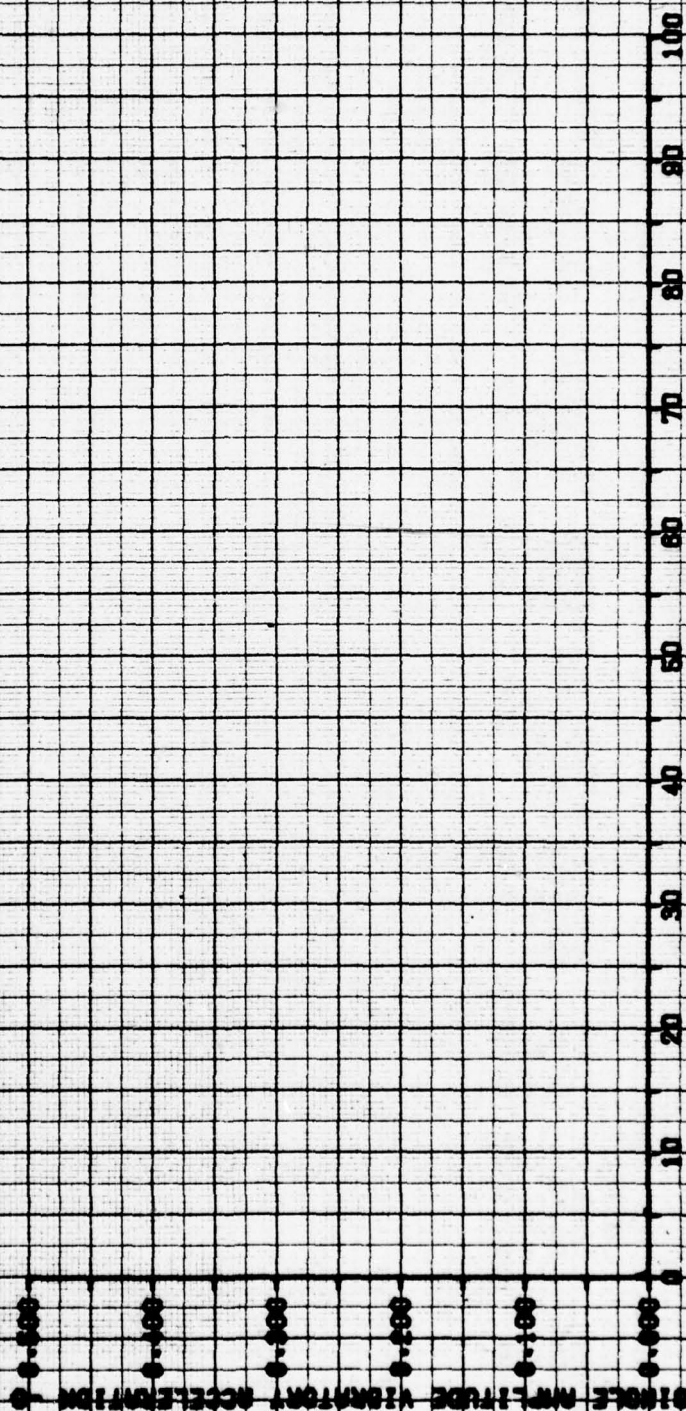


FIGURE 24

VIBRATION CHARACTERISTICS

LOCATION	TRANSMISSION	WIND-1M	USA 8/N	68-08889	FUNDAMENTAL FREQUENCY IS 5.40 HZ
AXIS	LATERAL	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.
GROSS	LONG	ALTITUDE	TEMPERATURE	SPEED	FLIGHT CONFIGURATION
WEIGHT	CG #8	-IN.	-DEG C	-RPM	CONDITION
-LB	152.7 (FWD)	0.0 (MID)	14.0	324.0	ZERO
					GROUND RUN
					CLEAN

FLT 2
TRX 5
VCO 85
MRB 0
MIN 35
SEC 35
GRP 0

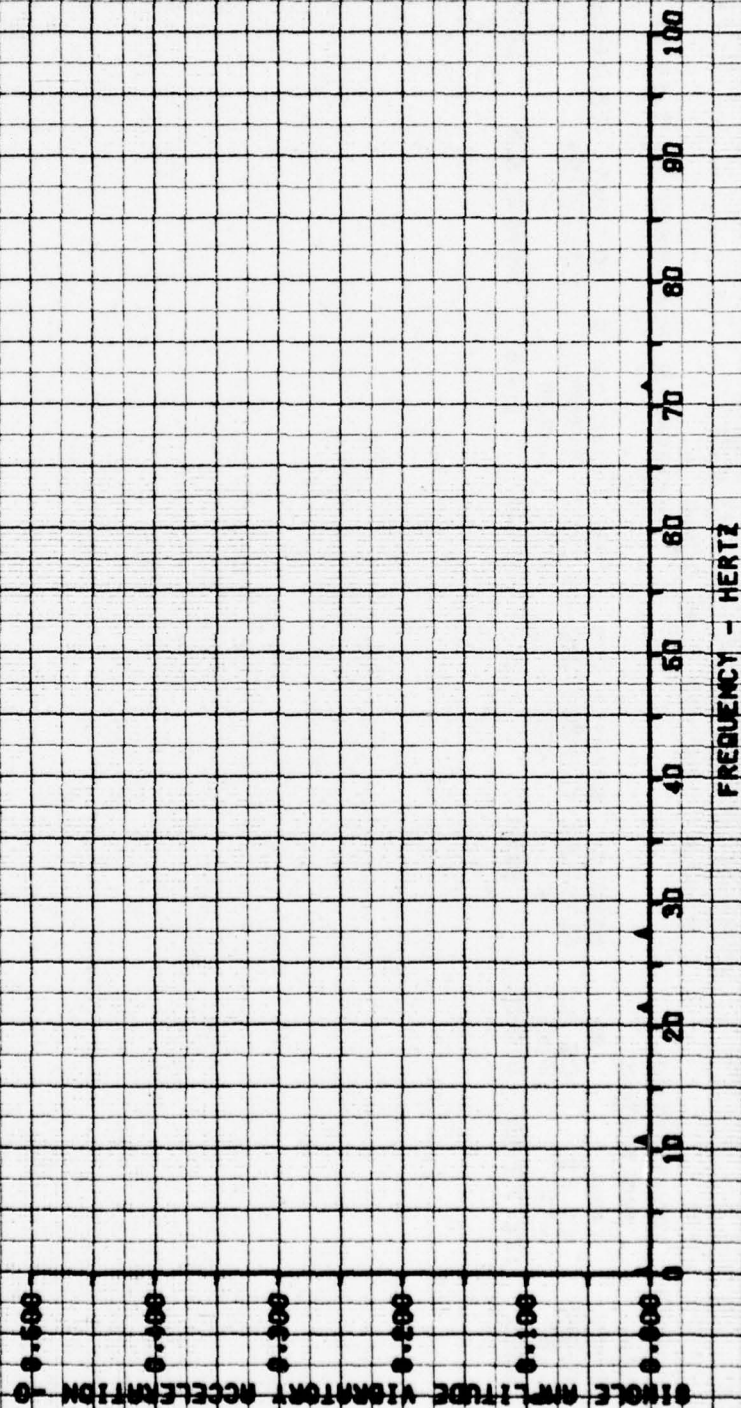


FIGURE 25

VIBRATION CHARACTERISTICS

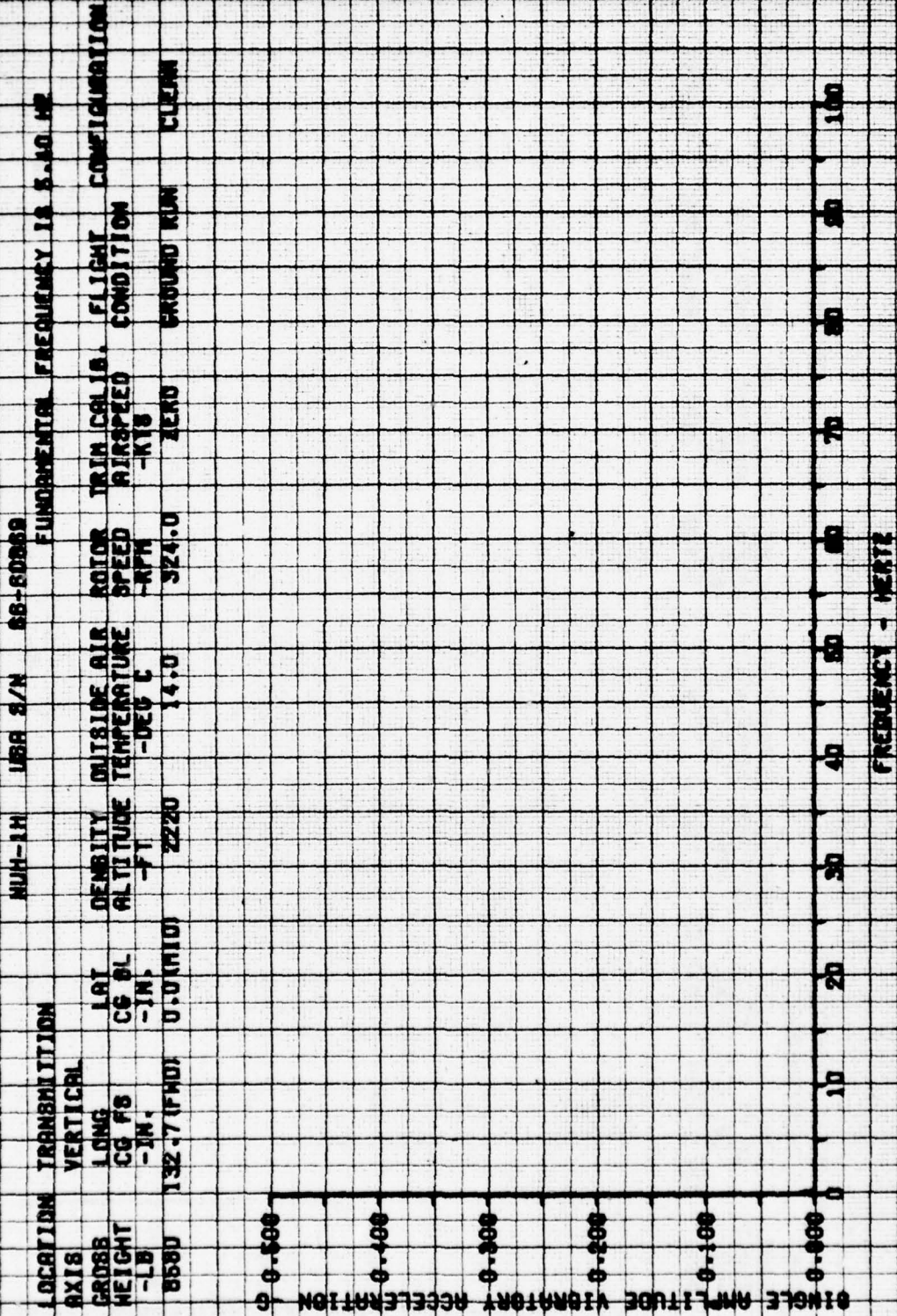
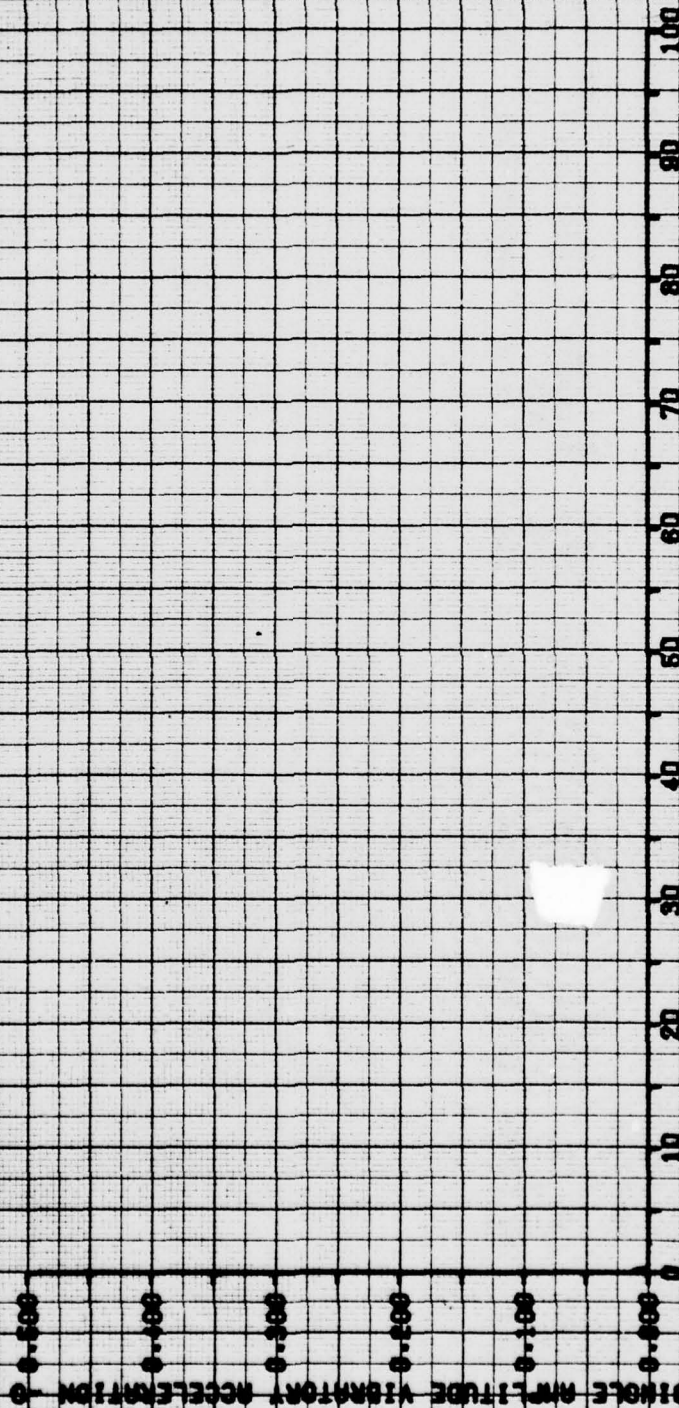


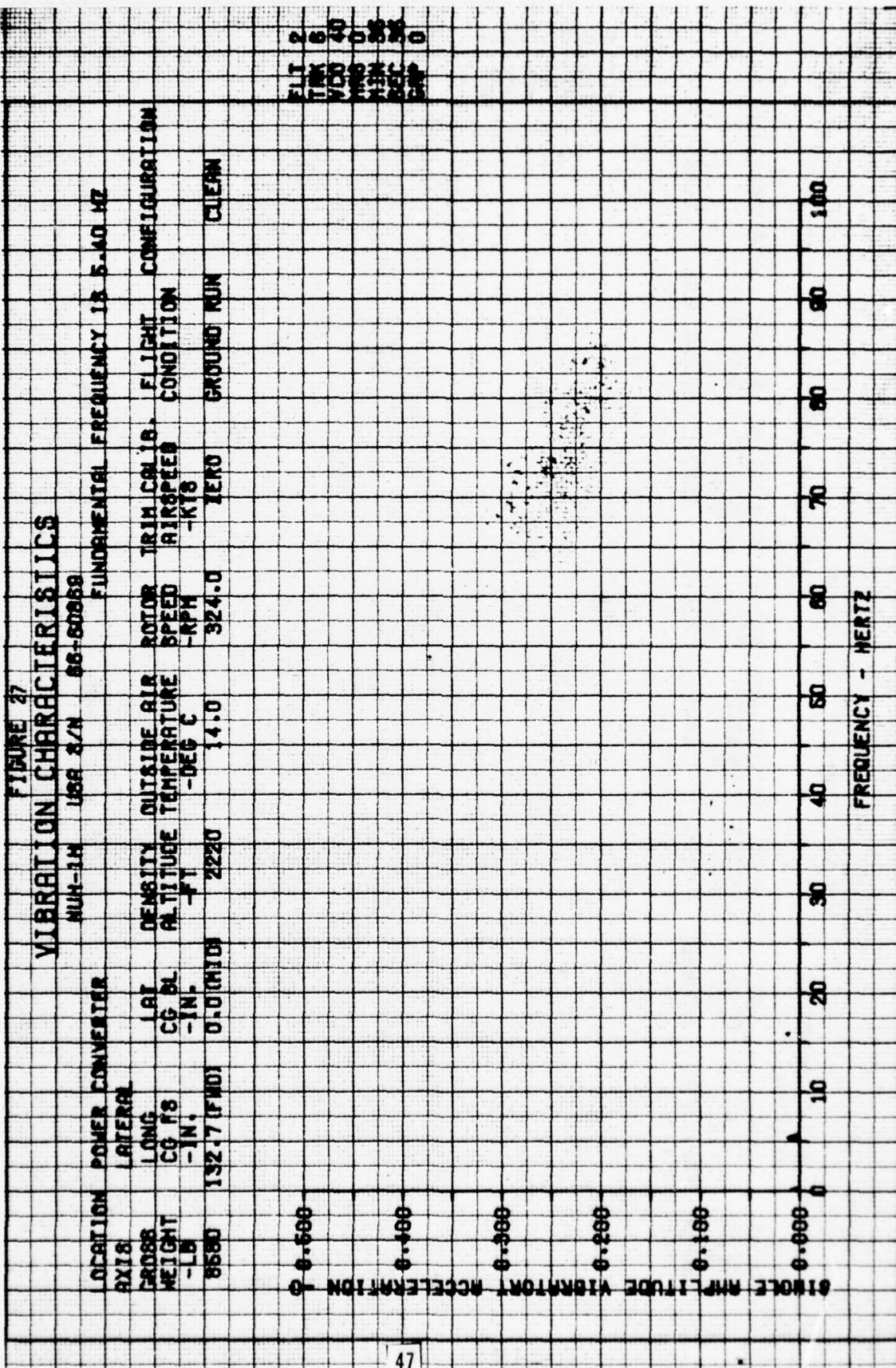
FIGURE 25

VIBRATION CHARACTERISTICS

LOCATION	POWER CONVERTER	NUM-1H	USA 2/N	SS-50859	FUNDAMENTAL FREQUENCY IS 5.10 HZ
AXIS	LONGITUDINAL				
WEIGHT	LONG	DENSITY	OUTSIDE AIR	ROTOR TRIM	FLIGHT CONFIGURATION
-LB	CG #3	ALTITUDE	TEMPERATURE	SPEED	AIRSPED CONDITION
	-IN.	-FT	-DEG C	-RPM	-KTS
8550	132.7 (P101)	2220	14.0	324.0	ZERO
	D. (W10)				GROUND RUN
					CLEAN

FLI 2
TRK 8
VCD 25
HRS 0
MIN 55
SEC 55
DRP 0





FLT 2
 TRK 6
 VCO 40
 MAG 0
 MIN 56
 DEC 56
 SWP 0

FIGURE 28

VIBRATION CHARACTERISTICS

LOCATION	POWER CONVERTER	NUH-1H	USA 8/N	66-60869	FUNDAMENTAL FREQUENCY IS 5.40 HZ
RX18	VERTICAL				
CROSS WEIGHT	LONG	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.
-LB	CG BL	ALTITUDE	TEMPERATURE	SPEED	FLIGHT
	-IN.	-FT	-DEG C	-RPM	CONDITION
8680	132.7 (FWD)	2220	14.0	324.0	ZERO
	0.0 (MID)				GROUND RUN
					CLEAN

FLT 2
TRK 6
VCD 55
MRB 0
MIN 36
SEC 36
GRP 0

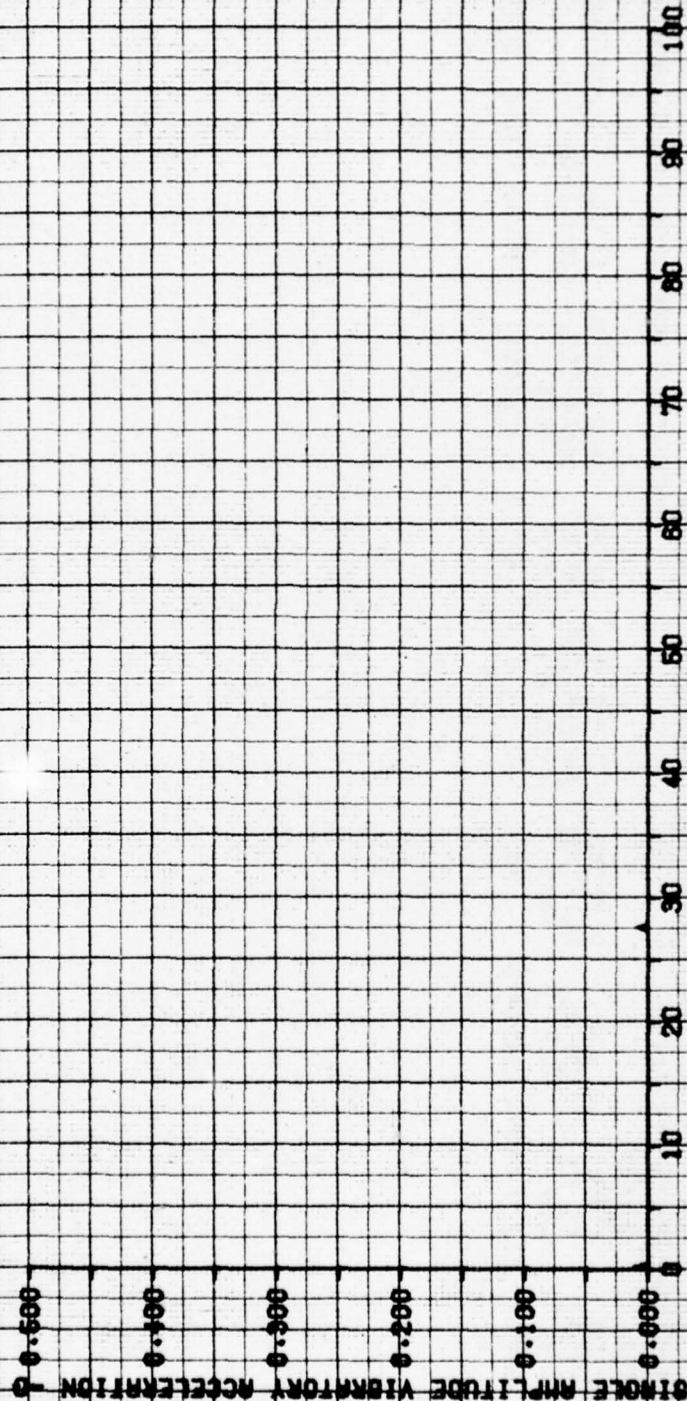


FIGURE 29

VIBRATION CHARACTERISTICS

LOCATION COLLECTIVE CONTROL
 AXIS VERTICAL
 GROSS LONG
 HEIGHT CG F8
 -LB 132.7 (FWD)
 0.0 (HTO)
 2220
 14.0
 324.0
 ZERO
 GROUND RUN
 CLEAN
 FUNDAMENTAL FREQUENCY 18 5.40 HZ

SINGLE AMPLITUDE VIBRATION ACCELERATION
 0.500
 0.400
 0.300
 0.200
 0.100
 0.000

FREQUENCY - HERTZ
 10 20 30 40 50 60 70 80 90 100

FLT 2
 INK 7
 VCS 25
 MAG 0
 MIN 50
 SEC 30
 SWP 0

FIGURE 30

VIBRATION CHARACTERISTICS

NUA-1H USA 2/N 00-00000

FUNDAMENTAL FREQUENCY IS 5.10 HZ

LOCATION CYCLIC CONTROL

AXIS LONGITUDINAL

20000 LONG

WEIGHT CO 78

-1N

132.77 IN

0.0010

2230

14.0

324.0

ZERO

GROUND RUN

CLEAN

DENSITY OUTSIDE AIR ROTOR TRIM CALIB FLIGHT CONFIGURATION

ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION

-1N -000 C -1N

2230 14.0 324.0 ZERO GROUND RUN CLEAN

SINGLE AMPLITUDE VIBRATORY ACCELERATION

FREQUENCY - HERTZ

FLT 2
TAX 7
VCR 48
WDS 0
HIN 36
SAC 36
DAP 0

FIGURE 31

VIBRATION CHARACTERISTICS

LOCATION	CYCLIC CONTROL	NUM-1M	USA S/N	66-50869	FUNDAMENTAL FREQUENCY	18.5-10 HZ
AXIS	LATERAL					
CROSS	LONG	DENSITY	OUTSIDE AIR	ROTOR TRIM CALIB.	FLIGHT CONFIGURATION	
WEIGHT	CG FB	CG BL	ALTITUDE	TEMPERATURE	SPEED	AIR SPEED
-LB	-IN.	-IN.	-FT	-DEG C	-RPM	-KTS
8580	132.7 (FWD)	0.0 (HID)	2220	14.0	324.0	ZERO
						GROUND RUN
						CLEAN

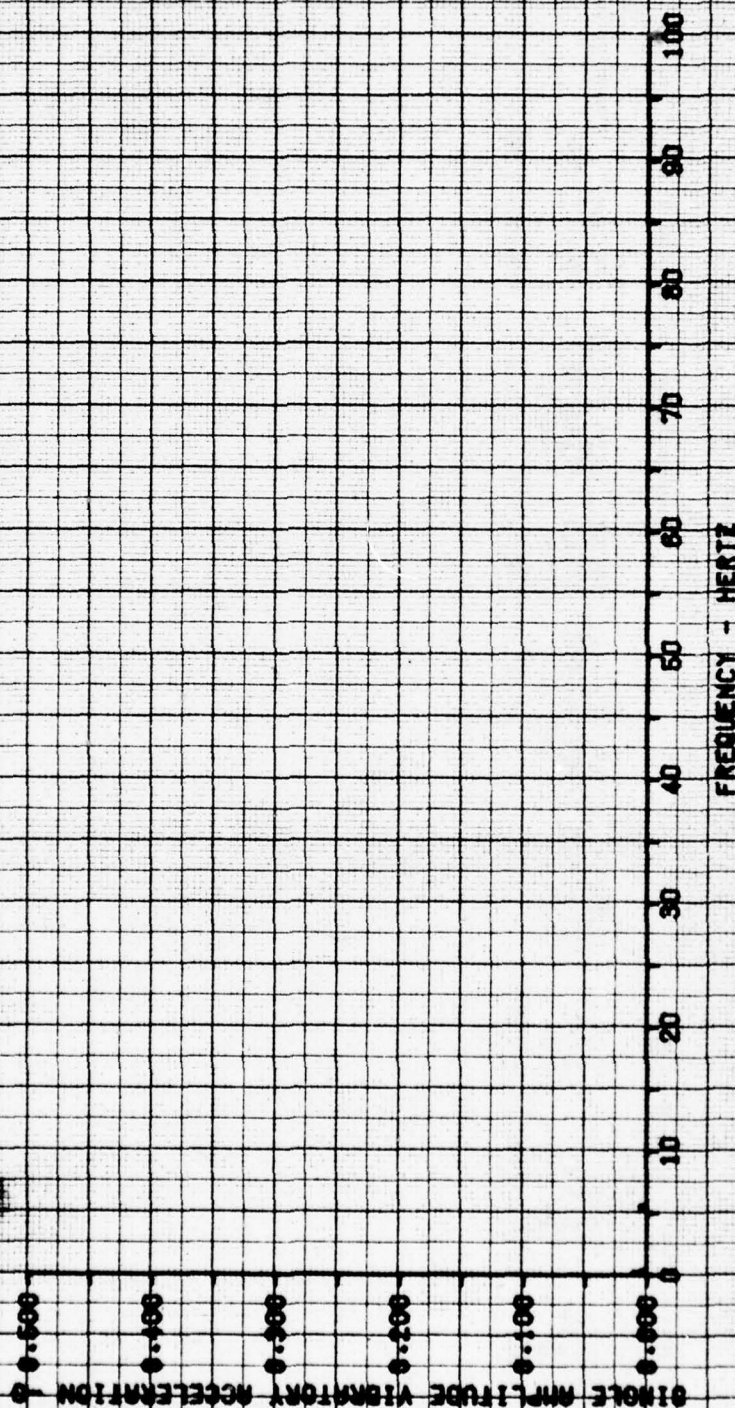
SINGLE AMPLITUDE VIBRATION ACCELERATION

FREQUENCY - HERTZ

FLT 2
TSM 1
VCS 0
HIN 0
RCL 0
ZAP 0

FIGURE 32
VIBRATION CHARACTERISTICS

LOCATION	FORWARD PALLET FLOOR MOUNT	UUA-1H	USA 8/N	58-50869	FUNDAMENTAL FREQUENCY IS 5.40 MHZ
AXIS	VERTICAL				
WEIGHT	LONG	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.
-LB	CG 1/8	ALTITUDE	TEMPERATURE	SPEED	FLIGHT
	-IN.	-FT	-DEG C	-RPM	CONDITION
					-K18
8580	1.5E7 7FMO1	0.0 (HID)	2220	324.0	ZERO
					ZERO
					GROUND RUN
					CLEAN



ELT	2		
TRK	7		
VCS	70		
WRB	0	35	
MIN	35		
REF	0		

FIGURE 34

VIBRATION CHARACTERISTICS

NUM-1H USA S/N 88-80869
FUNDAMENTAL FREQUENCY IS 5.40 HZ

LOCATION	PALLET	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.	FLIGHT	CONFIGURATION
AXIS	LATERAL	ALTITUDE	TEMPERATURE	SPEED	AIR SPEED	CONDITION	
CROSS	LONG	-FT	-DEG C	-RPM	-KTS		
WEIGHT	CG FS						
-LB	-IN.						
8800	134.2 (FWD)	0.0 (MID)	14.0	824.0	HOVER	6-FT HOVER	CLEAN

FLT 2
TRX 4
VCD 86
HRS 0
MIN 4
SEC 15
GRP 0

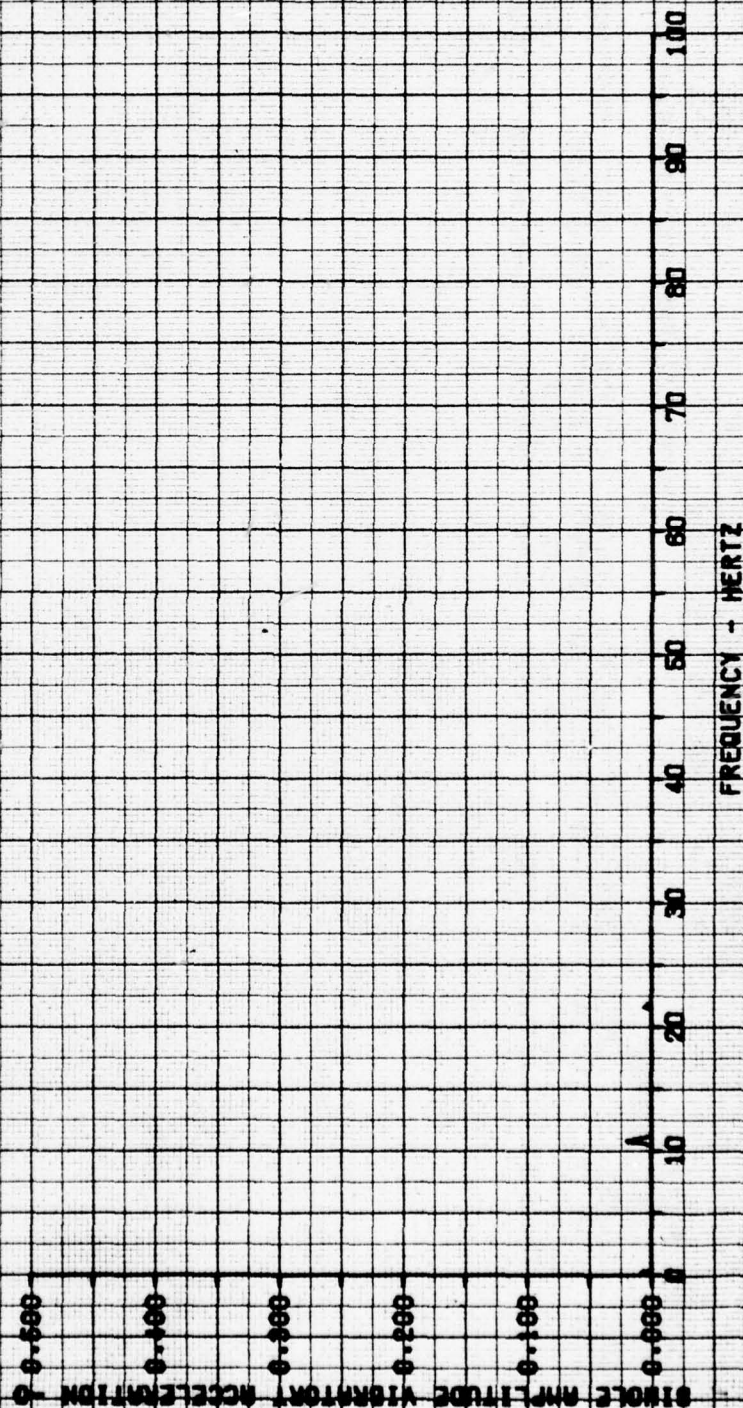


FIGURE 36

VIBRATION CHARACTERISTICS

NUH-1H USA S/N 66-60869

FUNDAMENTAL FREQUENCY IS 5.40 HZ

LOCATION	PILOT SEAT	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.	FLIGHT	CONFIGURATION
AXIS	LONGITUDINAL	ALTITUDE	TEMPERATURE	SPEED	AIR SPEED	CONDITION	
CROSS	LONG	-FT	-DEG C	-RPM	-KTS		
WEIGHT	CG FS	CG BL					
-LB	-IN.	-IN.					
8800	134.2 (FWD)	0.0 (MID)	2180	324.0	HOVER	5-FT HOVER	CLEAN

FLT 2
TRK 5
VCD 25
HRS 0
MIN 4
SEC 15
DRP 0

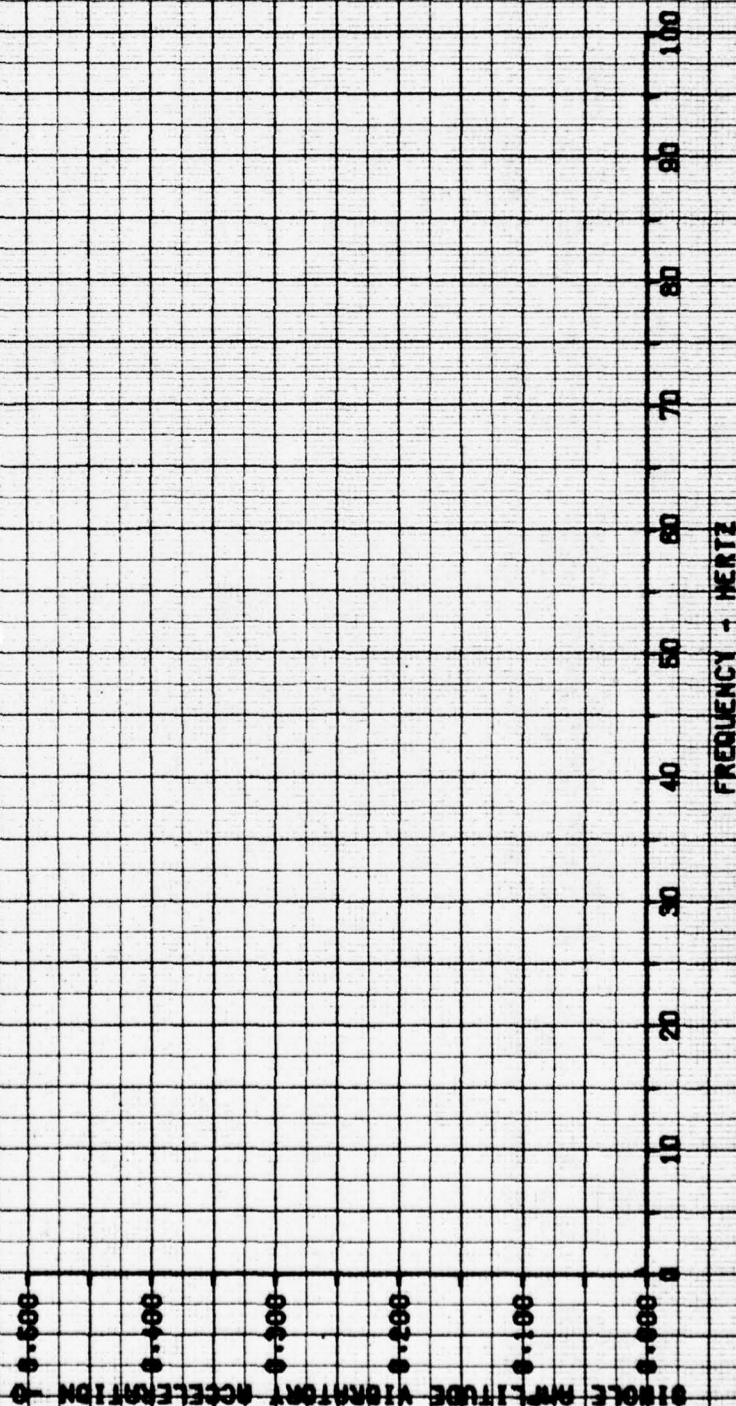
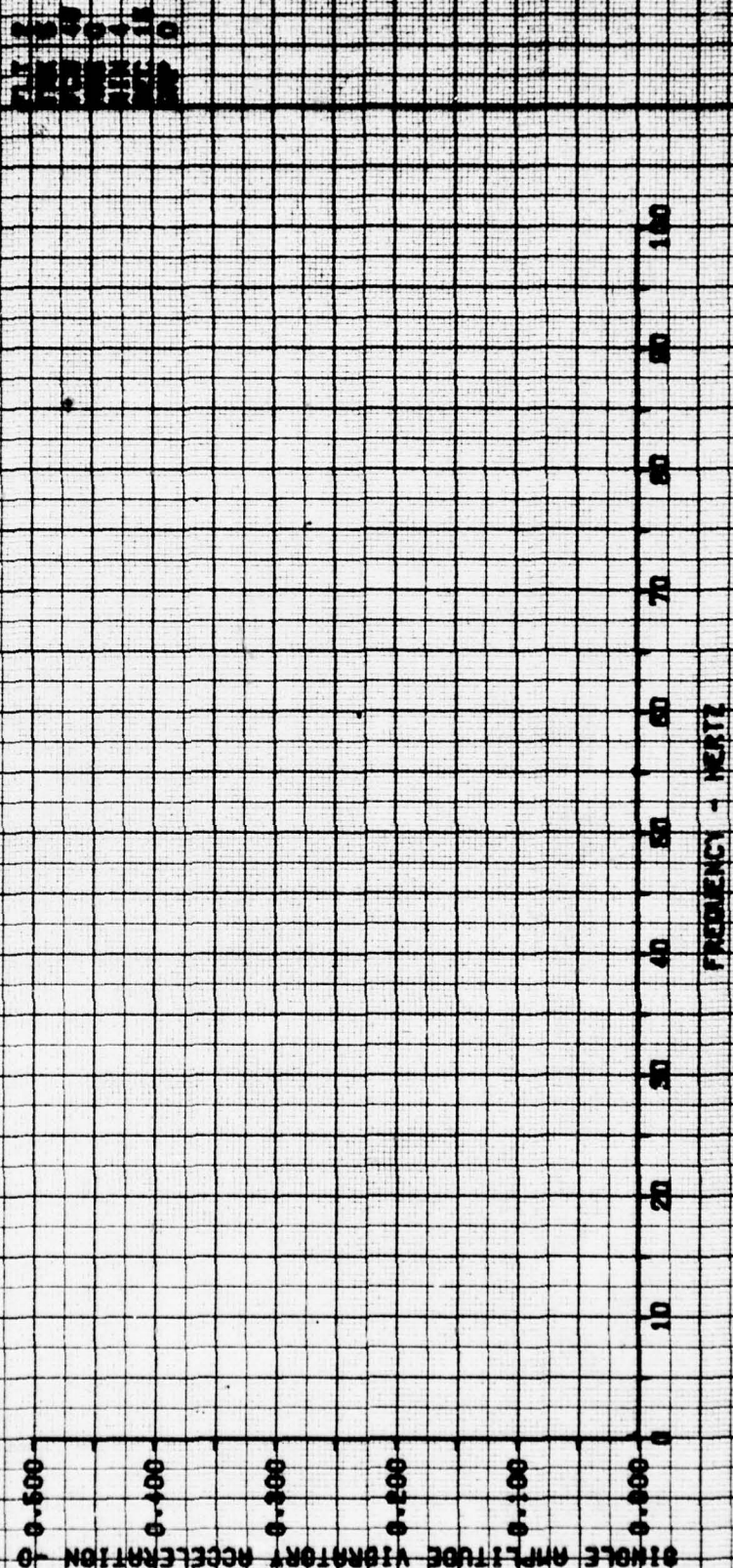


FIGURE 37

VIBRATION CHARACTERISTICS

LOCATION PILOT SEAT
 AXIS LATERAL
 GROSS WEIGHT 8900
 CG F8 154.2 (FWD) 0.0 (MID)
 CG BL -IN. 2180
 DENSITY 14.0
 ALTITUDE TEMPERATURE -DEG C 14.0
 ROTOR SPEED -RPM 524.0
 AIRSPEED -KTS HOVER
 TRIM CALIB. FLIGHT CONDITION
 FUNDAMENTAL FREQUENCY IS 5.40 HZ



0.500
 0.400
 0.300
 0.200
 0.100
 0.000

FIGURE 38

VIBRATION CHARACTERISTICS

NUH-1H USA 2/N 88-80889

LOCATION	PILOT SEAT	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.	FLIGHT	CONFIGURATION
AXIS	VERTICAL	ALTITUDE	TEMPERATURE	SPEED	AIR SPEED	CONDITION	
CROSS	LONG	-FT	-DEG C	-RPM	-KTS		
WEIGHT	CG FS						
-LB	-IN.						
3000	134.2 (FWD)	2160	14.0	524.0	HOVER	5-FT HOVER	CLEAN
	0.0 (AID)						

FUNDAMENTAL FREQUENCY 12.5-10 HZ

FLT 2
TRIM 8
VCS 55
VCS 0
MIN 4
MAX 18
SEC 0

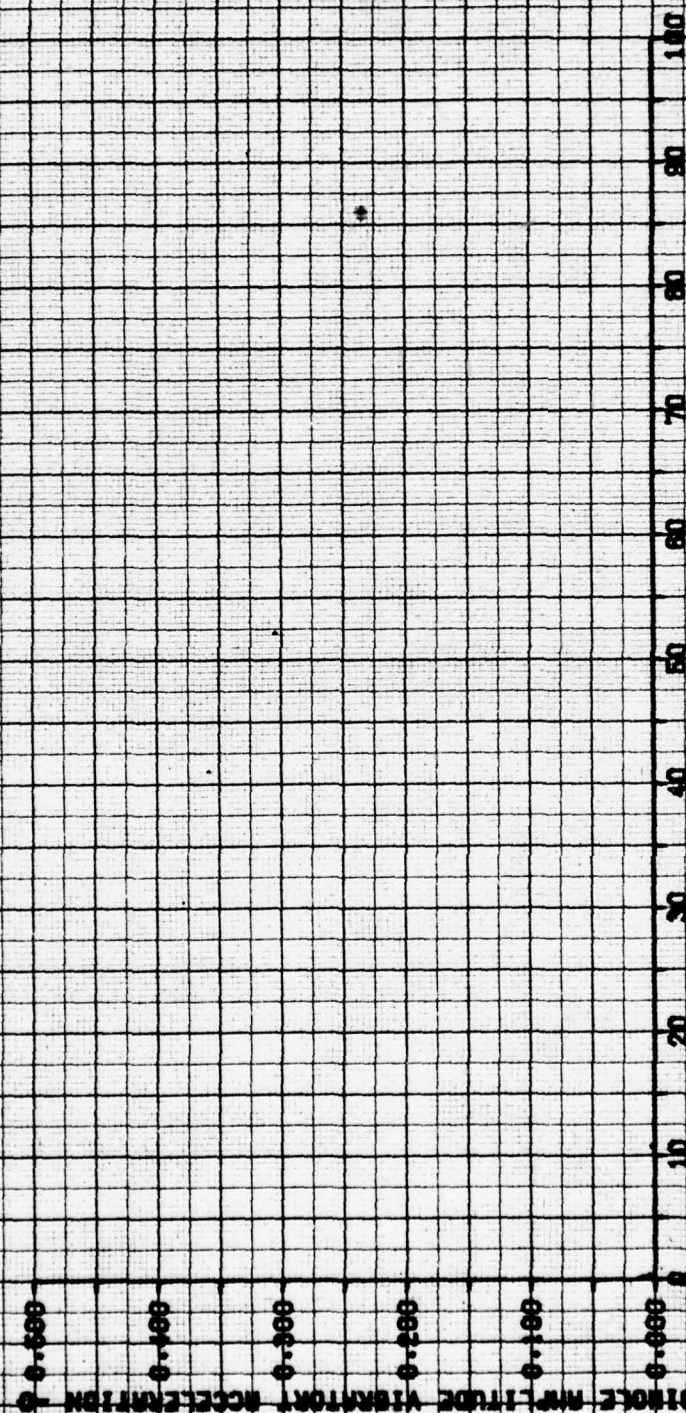


FIGURE 40

VIBRATION CHARACTERISTICS

MUH-1H USA S/N 68-60269

FUNDAMENTAL FREQUENCY IS 5.10 HZ

LOCATION TRANSMISSION

AXIS LATERAL

LONG

CO AS

-IN.

134.2 (740) 0.00100

LAT

CO BL

-IN.

2180

DENSITY

OUTSIDE AIR

ROTOR TRIM CALIB. FLIGHT CONFIGURATION

ALTIITUDE TEMPERATURE

SPEED -RPM

HOVER 5-FT HOVER CLEAN

-DEG C

14.5

824.0

2180

5-FT HOVER

CLEAN

FLY 2
TRK 5
VCD 55
MRB 0
MIN 4
DEC 15
DRP 0

0.000

0.000

0.000

0.000

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FIGURE 41

VIBRATION CHARACTERISTICS

LOCATION	TRANSMISSION	MUH-1H	USA 8/N	68-80889	FUNDAMENTAL FREQUENCY	12 5.10 Hz
AXIS	VERTICAL					
ORIGIN	LONG	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.	FLIGHT CONFIGURATION
HEIGHT	CG F/S	ALTITUDE	TEMPERATURE	SPEED	AIR/SPEED	CONDITION
-LB	-IN.	-FT	-DEG C	-RPM	-KTS	
8900	134.2 (FWD) 0.0 (MID)	2160	14.0	324.0	HOVER	5-FT HOVER
						CLEW

FLY 2
 FWD 6
 VCS 100
 AHS 0
 AHA 4
 AHC 18
 AHP 0

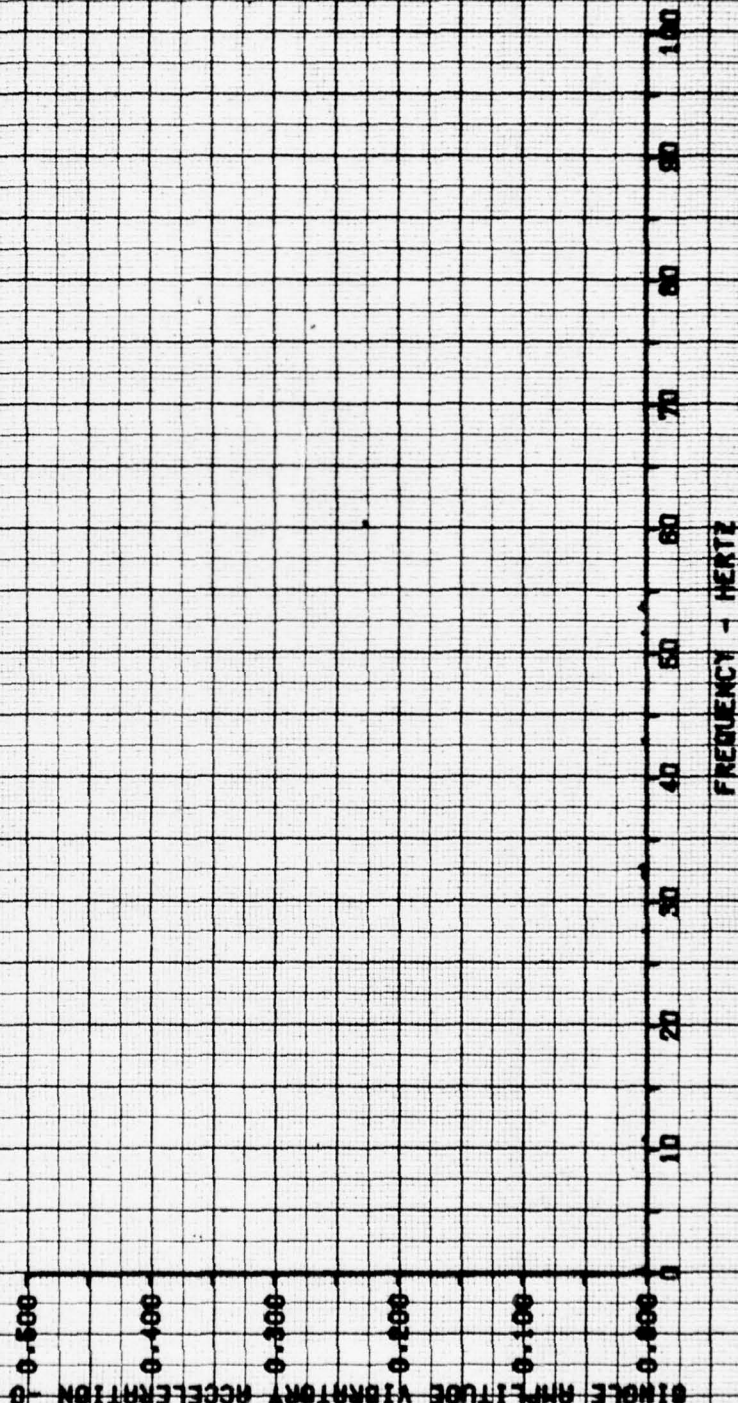
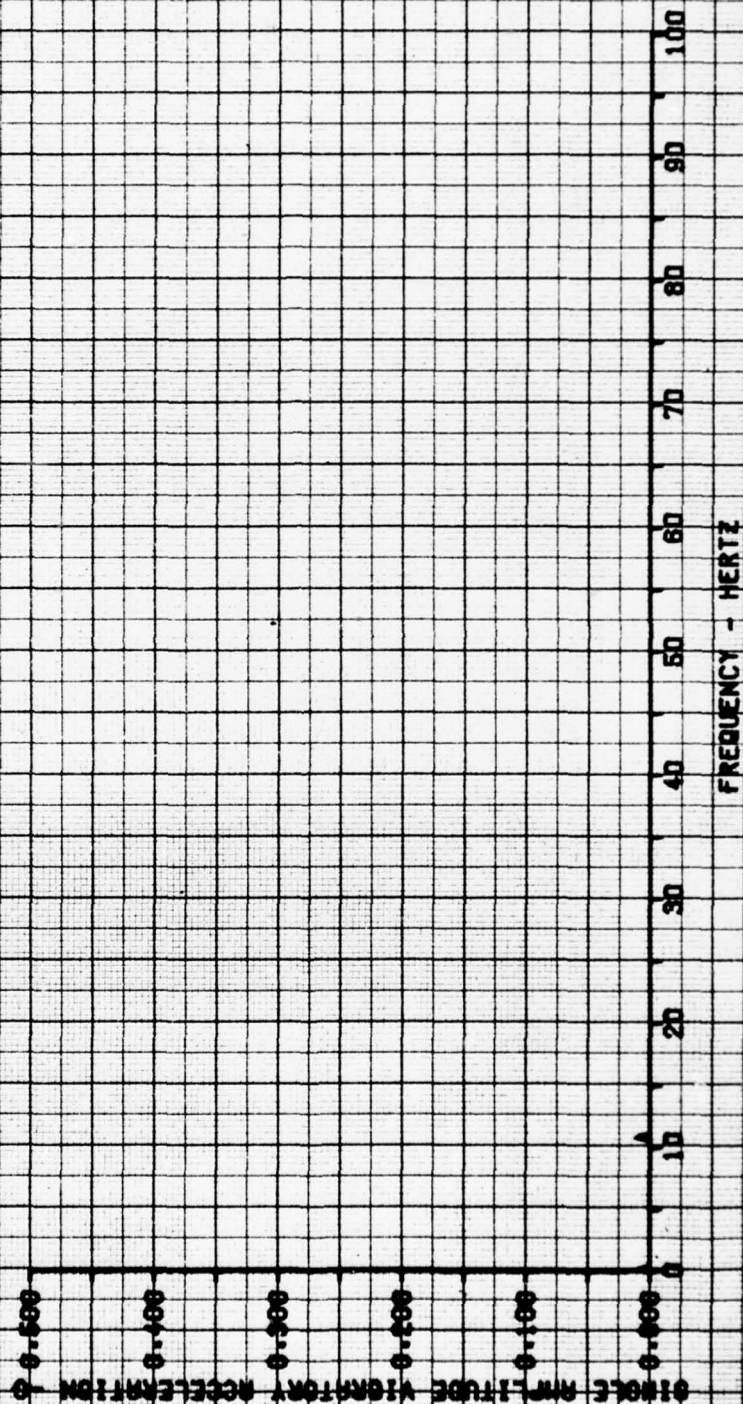


FIGURE 42

VIBRATION CHARACTERISTICS

LOCATION	POWER CONVERTER	WIND-114	USA 8/N	68-60869	FUNDAMENTAL FREQUENCY IS 5.10 HZ
AXIS	LONGITUDINAL				
CROSS	LONG	DENSITY	OUTSIDE AIR	ROTOR TRIM	CONFIGURATION
WEIGHT	CG F6	ALTITUDE	TEMPERATURE	SPEED	AIR/SPEED
-LB	-IN.	-FT	-DEG C	-RPM	-KTS
6800	134.2 (FWD)	0.0 (MID)	14.0	324.0	HOVER
					5-FT HOVER
					CLEAR

FLT 2
 FRK 8
 YCD 26
 HRS 0
 MIN 4
 SEC 15
 SRP 0



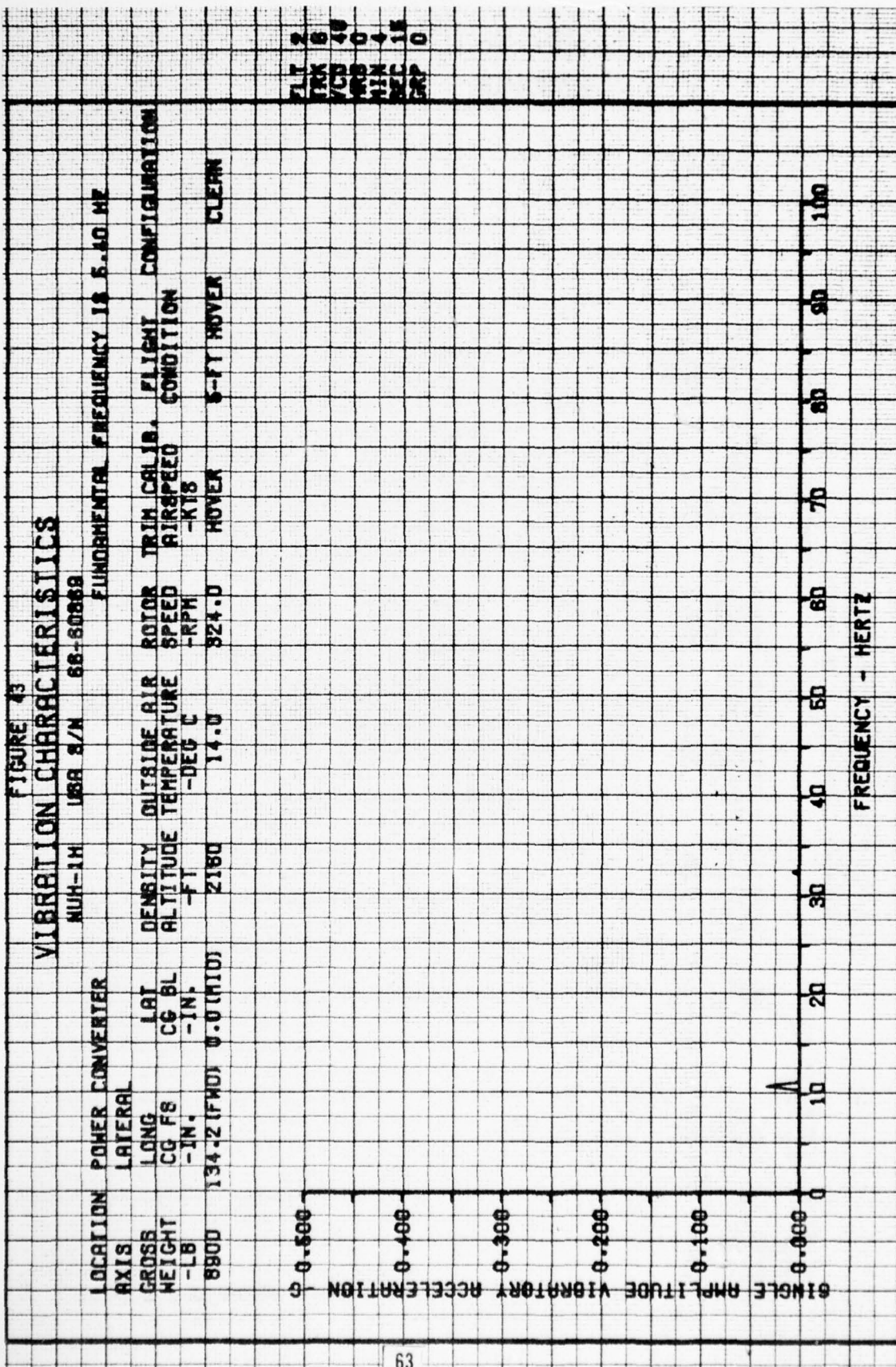
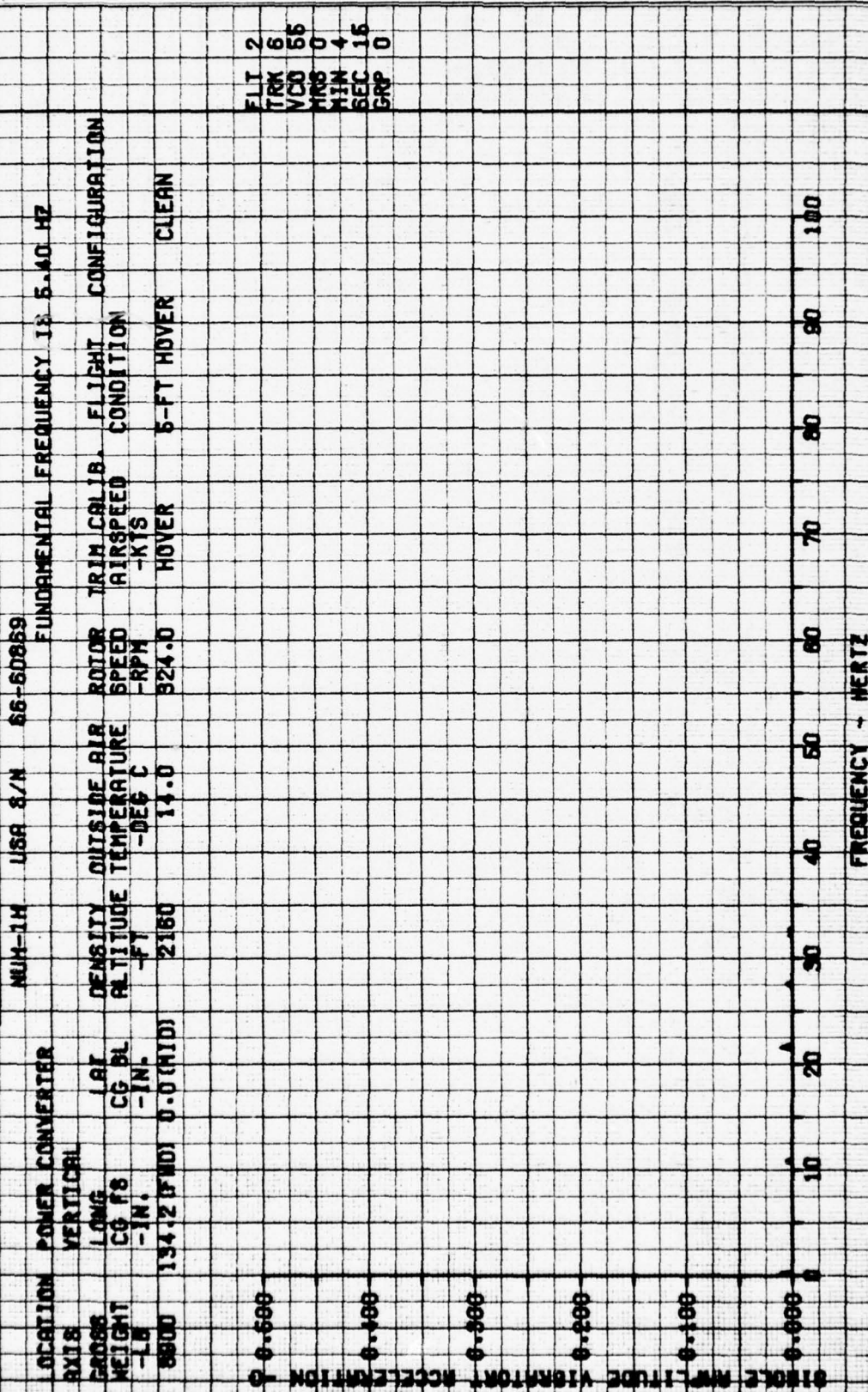


FIGURE 4A

VIBRATION CHARACTERISTICS



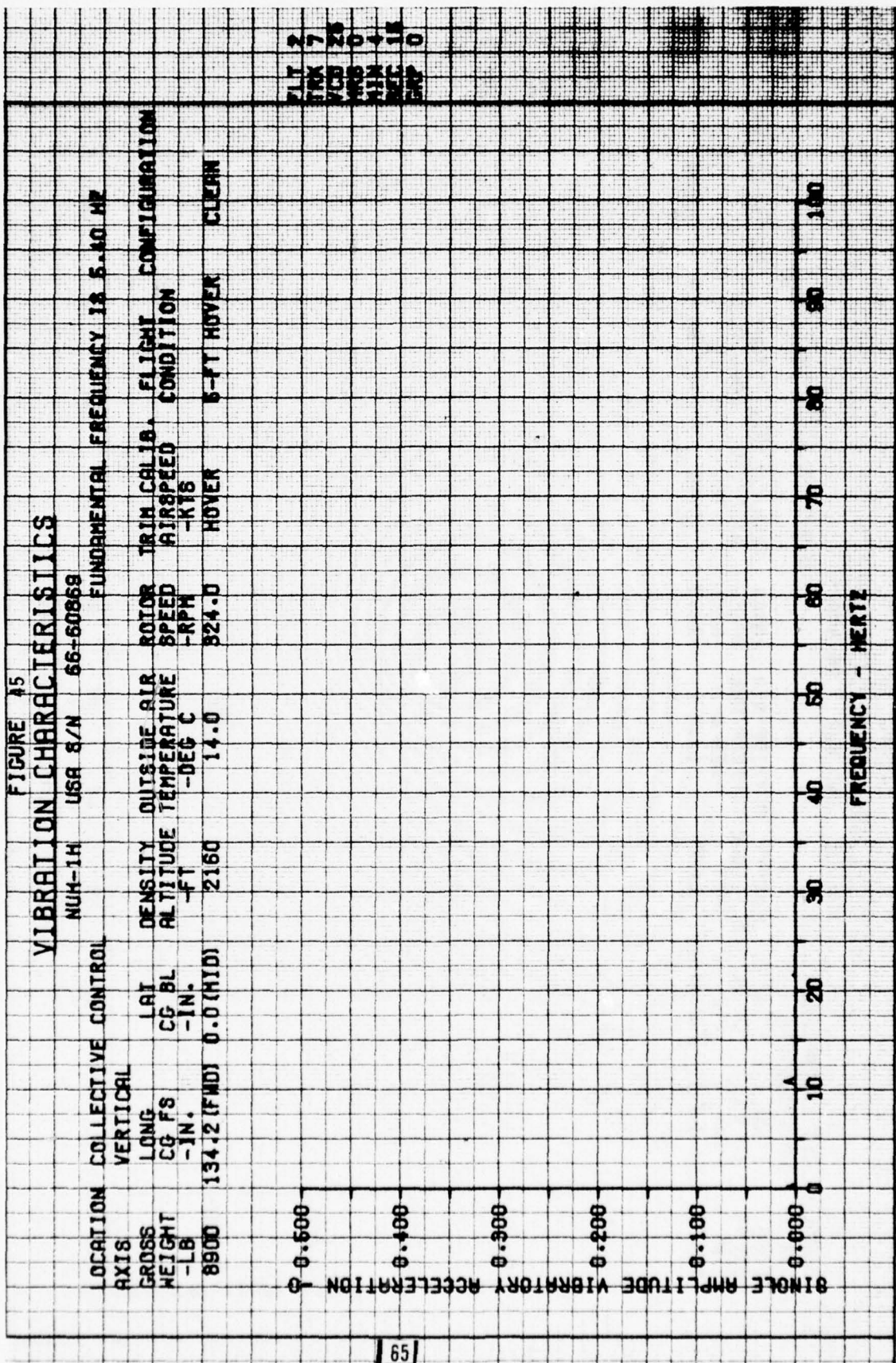


FIGURE 16

VIBRATION CHARACTERISTICS

LOCATION CYCLIC CONTROL
 AXIS LONGITUDINAL
 PROBE LONG LAT
 WEIGHT CG F8 CG BL
 -LB -IN. -IN.
 3500 134.2 (FWD) 0.0 (MID) 2160
 DENSITY OUTSIDE AIR ROTOR TRIM CALIB. FLIGHT CONFIGURATION
 ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION
 -FT -DEG C -RPM -KTS
 2160 14.0 524.0 HOVER 6-FT HOVER CLEAN
 FUNDAMENTAL FREQUENCY IS 5.40 HZ

FLT 2
 TRK 7
 VCB 40
 HNS 0
 HIN 4
 SET 15
 CRP 0

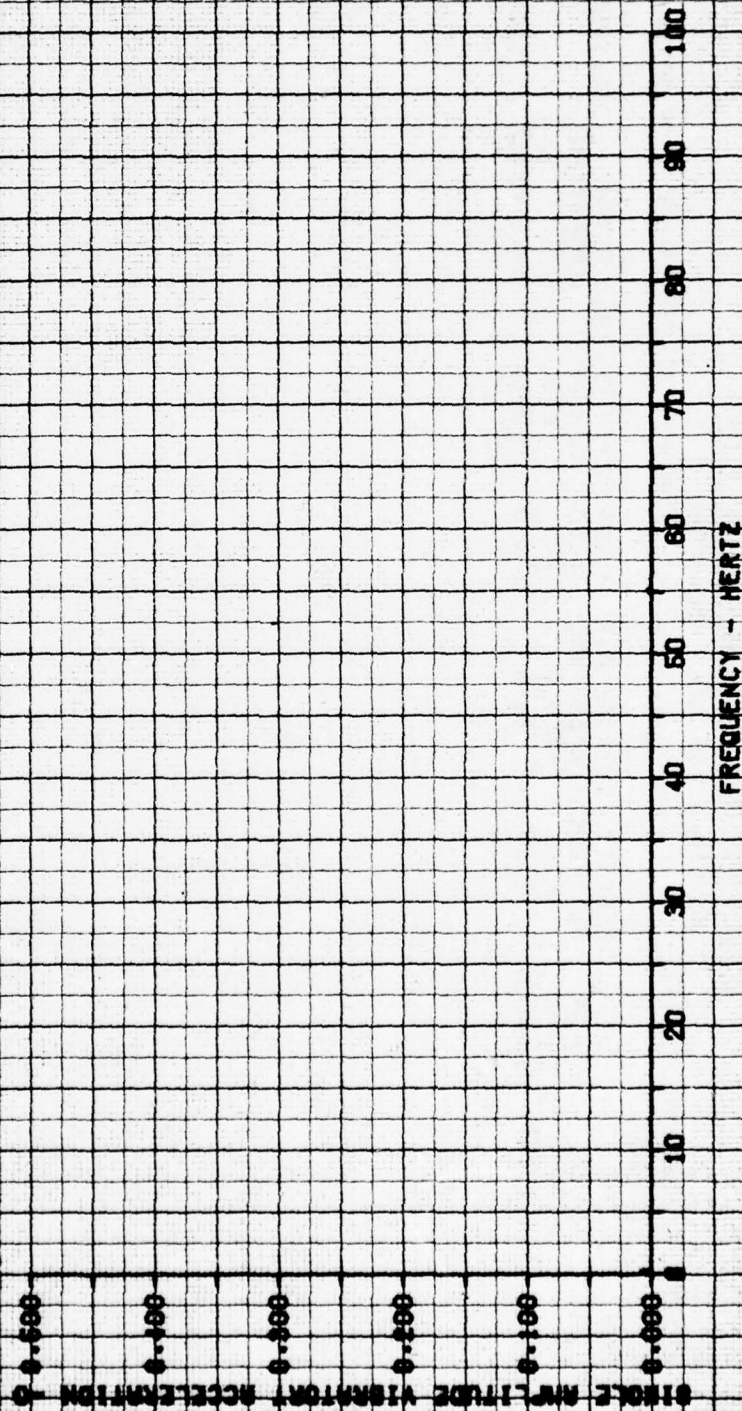
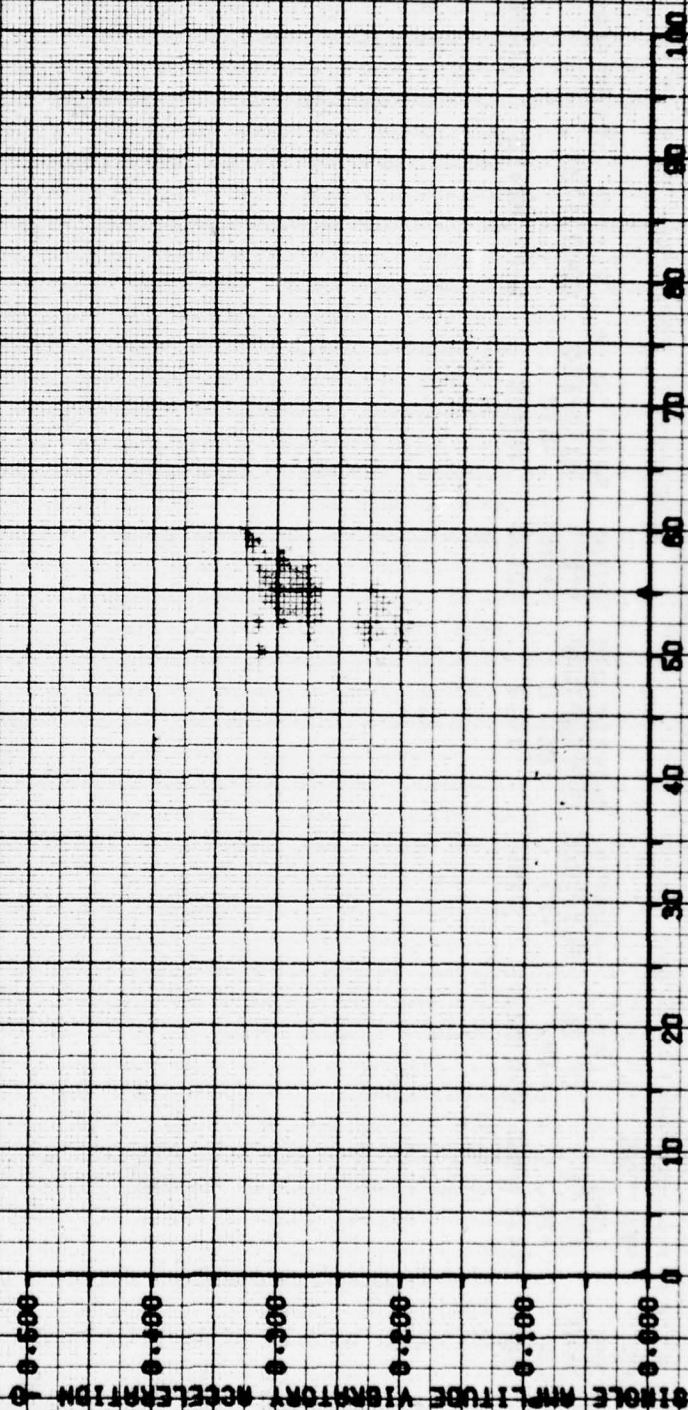


FIGURE 47

VIBRATION CHARACTERISTICS

LOCATION CYCLIC CONTROL
 AXIS LATERAL
 CROSS LONG
 WEIGHT CG FB
 -LB -IN.
 8900 134.2 (FWD) 0.0 (HD)
 DENSITY OUTSIDE AIR ROTOR TRIM CALIB. FLIGHT COMPLETION
 ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION
 -FT -DEG C -RPH -KTS
 2180 14.0 324.0 HOVER 5-PT HOVER CLEAR
 FUNDAMENTAL FREQUENCY IS 5.10 HZ

FLT 2
 FTK 7
 FCS 55
 FCS 0
 HIN 1
 HEC 18
 HAP 0



FREQUENCY - HERTZ

FIGURE 48

VIBRATION CHARACTERISTICS

NUM-1H USA S/N 66-60869

FUNDAMENTAL FREQUENCY 13.5-40 HZ

LOCATION FORWARD PALLET FLOOR MOUNT

AXIS VERTICAL

GROSS LONG

CG F8

-IN.

134.2 (FWD)

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

DENSITY OUTSIDE AIR

ALTIITUDE TEMPERATURE

-DEG C

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG BL

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG F8

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG BL

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG F8

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG BL

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG F8

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG BL

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG F8

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG BL

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG F8

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG BL

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG F8

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG BL

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG F8

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG BL

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG F8

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG BL

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG F8

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG BL

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG F8

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG BL

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG F8

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG BL

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG F8

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG BL

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG F8

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG BL

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG F8

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG BL

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG F8

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG BL

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG F8

-IN.

0.0 (H/D)

2160

14.0

524.0

HOVER

6-FT HOVER

CLEAR

CG BL

-IN.

0.0 (H/D)

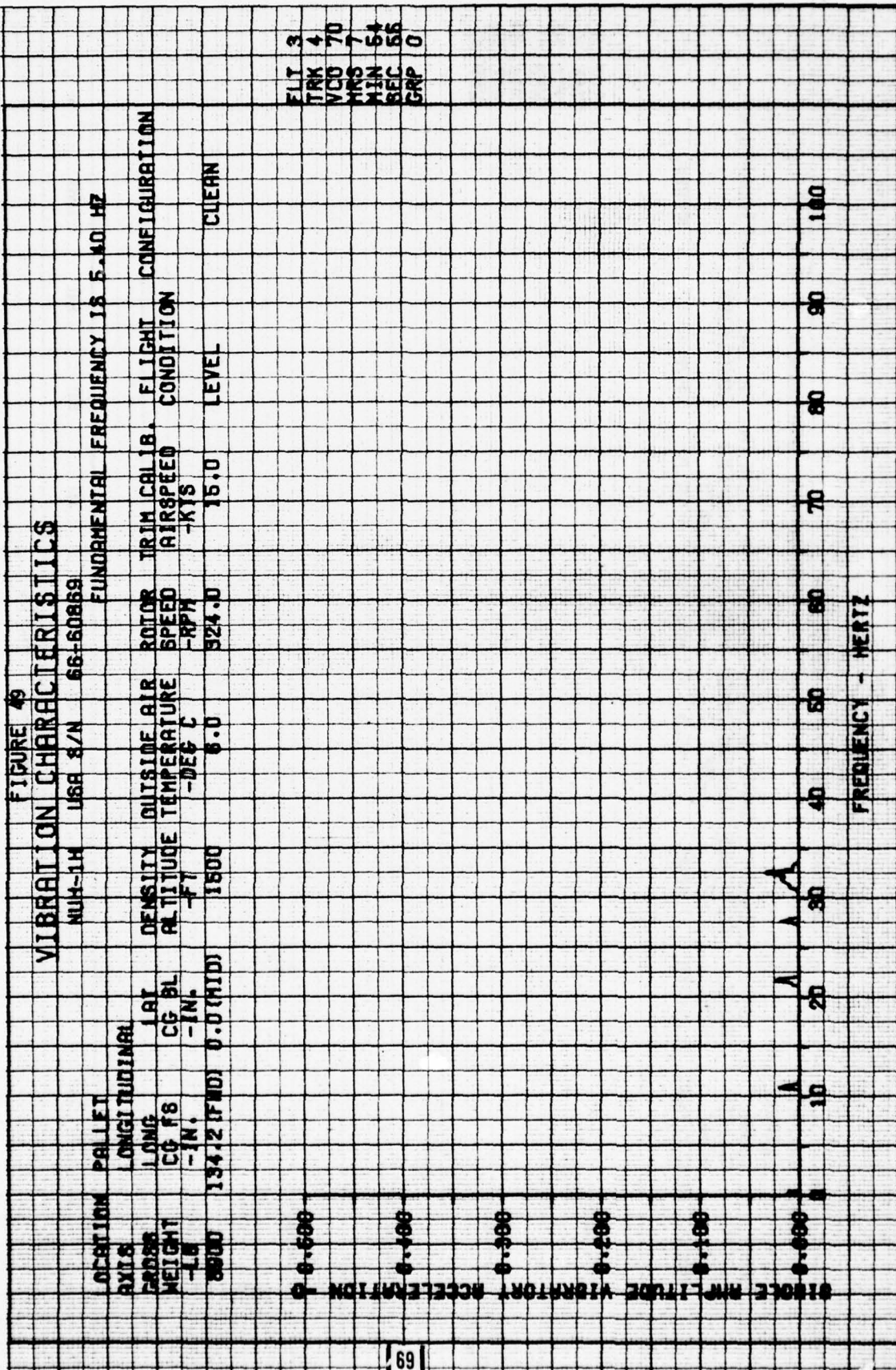


FIGURE 50

VIBRATION CHARACTERISTICS

NUH-1H USA S/N 66-60868

FUNDAMENTAL FREQUENCY IS 5.40 HZ

LOCATION PALLET

AXIS LAT/RAI

LONG

CG FS

-IN.

134.2 (FWD) 0.0 (AID)

LAT

CG BL

-IN.

0.0 (AID)

DENSITY

OUTSIDE AIR

TEMPERATURE

-DEG C

6.0

ALTITUDE

-FT

1500

ROTOR

SPEED

-RPM

324.0

TRIM CALIB.

FLIGHT

CONDITION

15.0

AIR SPEED

-KTS

15.0

LEVEL

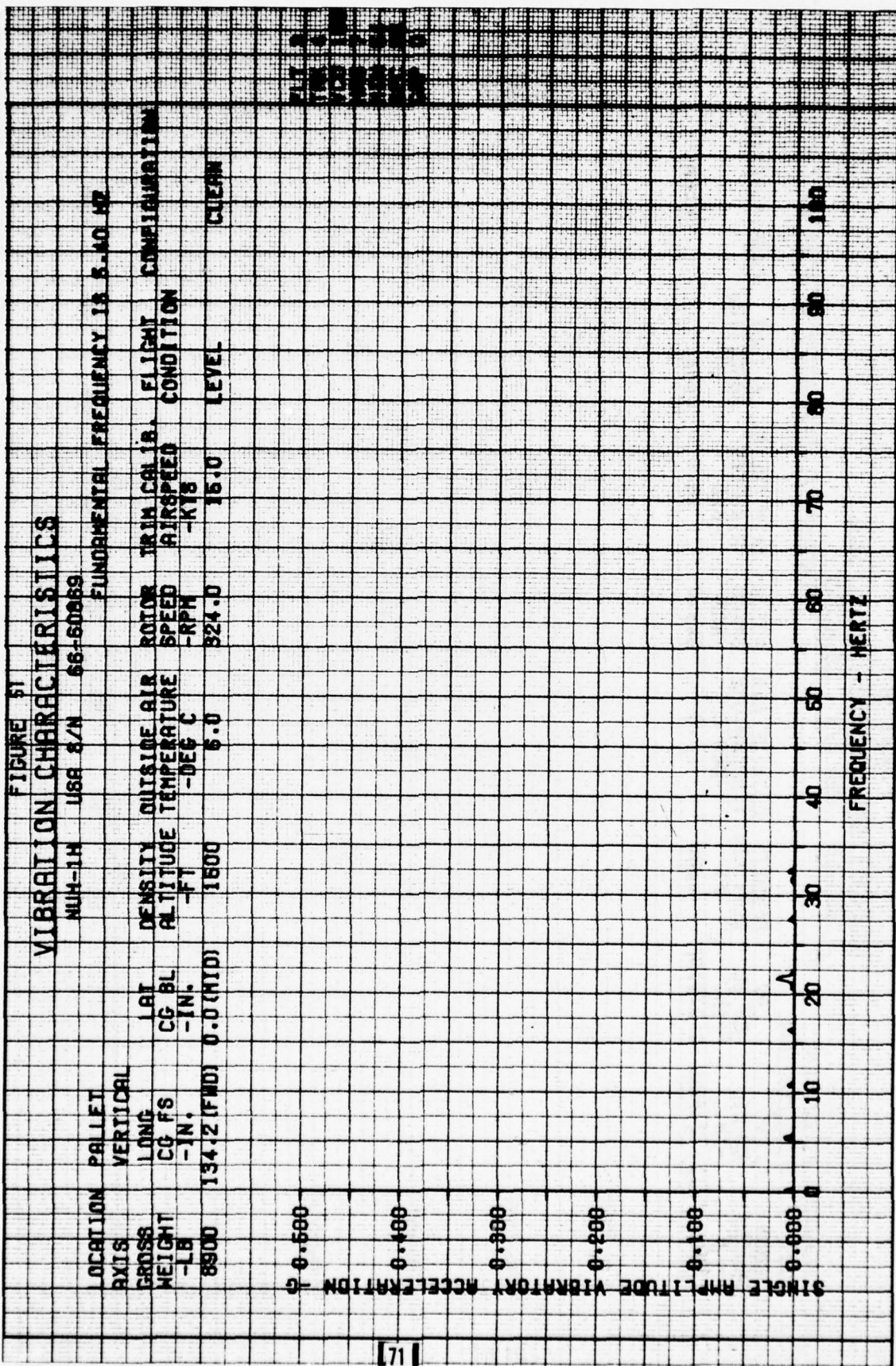
CLEAN

15.0

FLT 3
TRK 4
VCO 85
HRS 7
MIN 54
SEC 55
GRP 0

SINGLE AMPLITUDE VIBRATION ACCELERATION

FREQUENCY - HERTZ



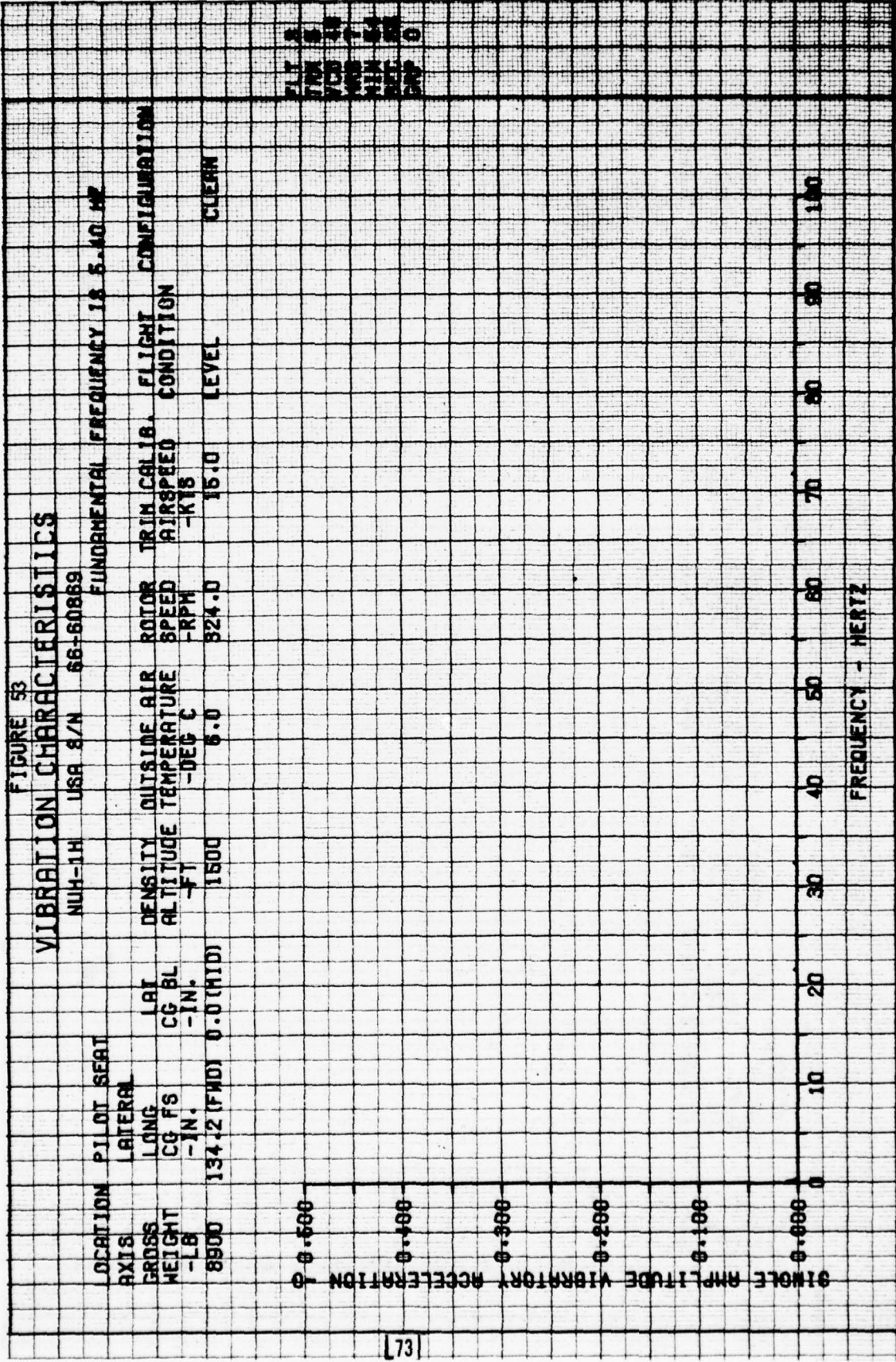


FIGURE 54

VIBRATION CHARACTERISTICS

LOCATION PILOT SEAT
 AXIS VERTICAL
 LONG
 CG #3
 -IN.
 134.2 (FWD) 0.0 (MID)
 1500
 ALTITUDE
 -FT
 1500
 DENSITY
 OUTSIDE AIR
 TEMPERATURE
 -DEG C
 5.0
 ROTOR
 SPEED
 -RPM
 524.0
 TRIM CALIB.
 AIRSPEED
 -KTS
 15.0
 FLIGHT
 CONFIGURATION
 CUEAN
 FUNDAMENTAL FREQUENCY IS 5.40 HZ

FLT 3
 TRK 5
 VCU 55
 HRS 7
 MIN 54
 SEC 58
 GAP 0

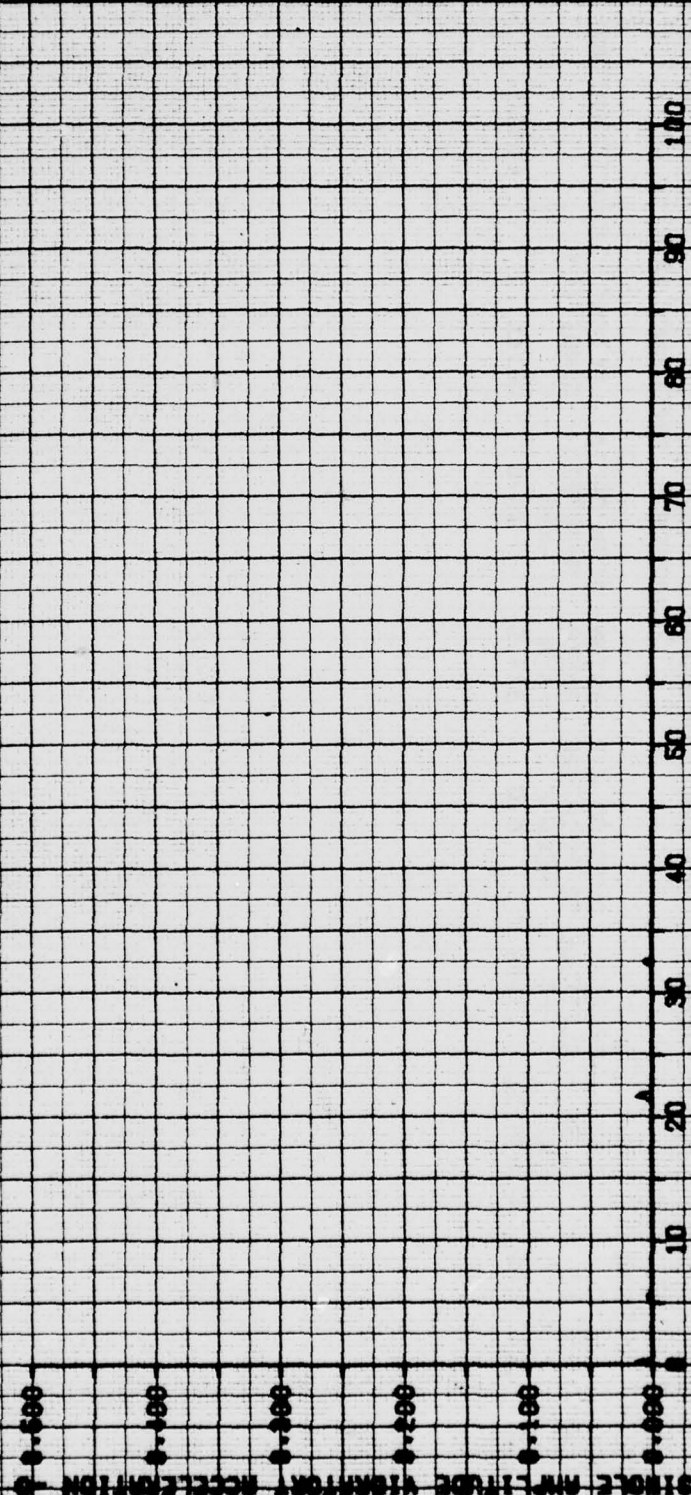
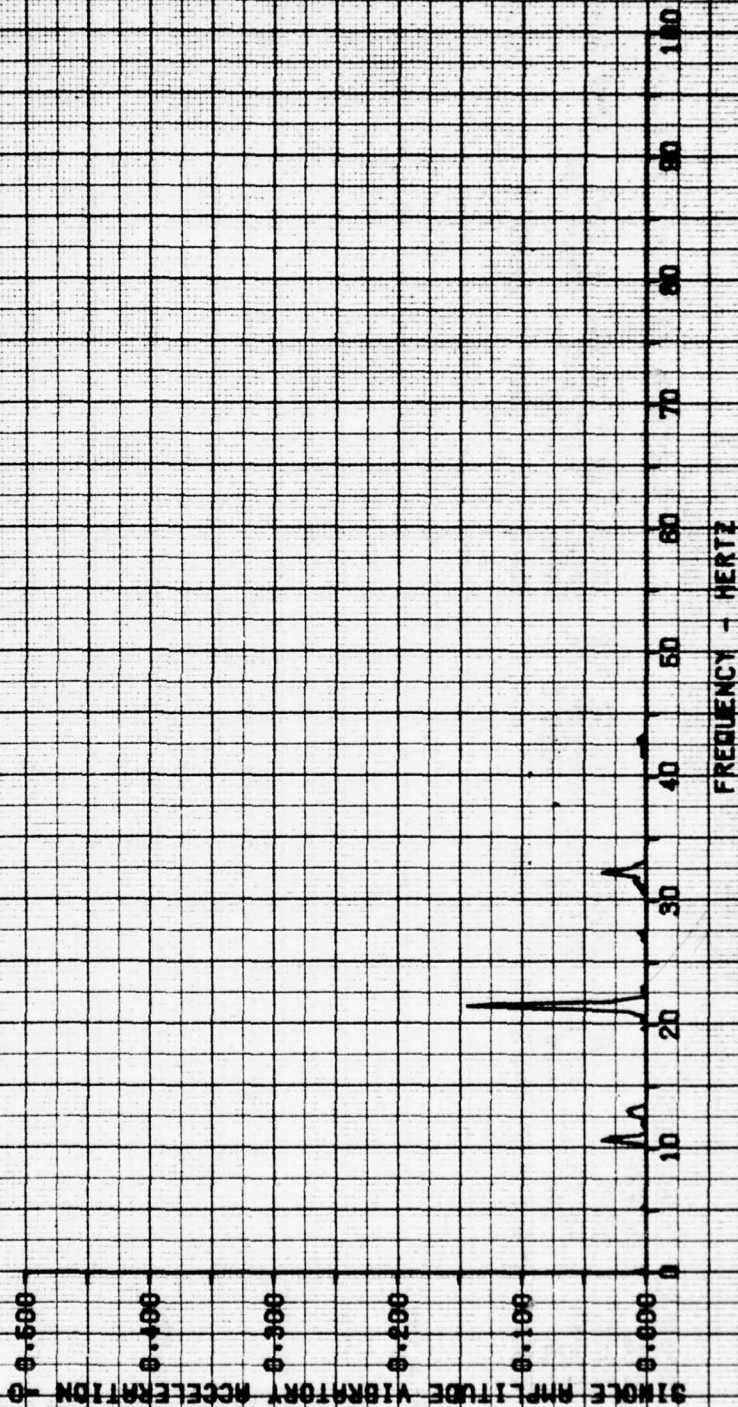


FIGURE 55

VIBRATION CHARACTERISTICS

LOCATION	TRANSMISSION	NUH-1H	USA S/N	68-60869	FUNDAMENTAL FREQUENCY	12.5-10 Hz
AXIS	LONGITUDINAL					
CROSS	LONG	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.	FLIGHT
WEIGHT	CG F8	ALTITUDE	TEMPERATURE	SPEED	AIR SPEED	CONDITION
-LB	-IN.	-FT	-DEG C	-RPM	-KTS	
8800	134.2 (FWO) 0.0 (HIO)	1500	8.0	824.0	15.0	LEVEL
						CLEAN



7.1 3
 7.2 5
 7.3 7
 7.4 9
 7.5 11
 7.6 13
 7.7 15
 7.8 17
 7.9 19
 8.0 21

FIGURE 57

VIBRATION CHARACTERISTICS

LOCATION TRANSMISSION
 AXIS VERTICAL
 GROSS WEIGHT 8900
 LONG CG FS 134.2 (FWD)
 LAT CG BL 0.0 (MID)
 ALTITUDE 1600
 DENSITY 8.0
 OUTSIDE AIR TEMPERATURE -06.0
 ROTOR SPEED 324.0
 TRIM CALIB. 15.0
 FLIGHT CONDITION LEVEL
 CONFIGURATION CLEAN
 USA S/N 66-60869
 FUNDAMENTAL FREQUENCY 18 5.10 HZ

211 3
 TRK 5
 VCU 100
 MDS 7
 MIN 54
 SEC 156
 CRP 0

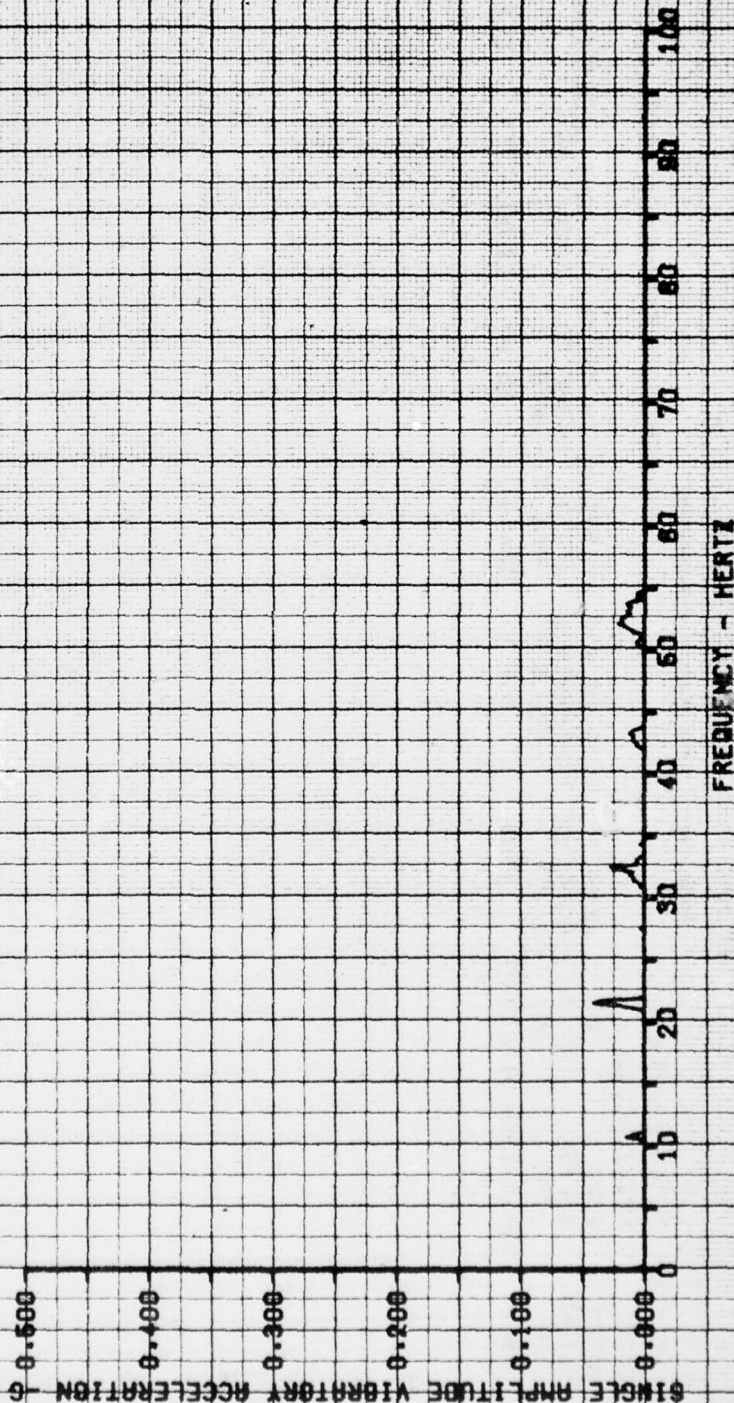


FIGURE 58

VIBRATION CHARACTERISTICS

LOCATION POWER CONVERTER		USA S/N 66-80889		FUNDAMENTAL FREQUENCY IS 5.10 HZ	
AXIS	LONGITUDINAL	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.
ORDER	LONG	ALTITUDE	TEMPERATURE	SPEED	FLIGHT
WEIGHT	CG F8	-FT	-DEG C	-RPM	CONDITION
	-IN.				-KTS
8900	134.2 (FWD)	0.0 (MID)	8.0	324.0	15.0
					LEVEL
					CLEAN

FLT 3
TRK 6
VCD 25
HRS 7
MIN 54
SEC 55
GRP 0

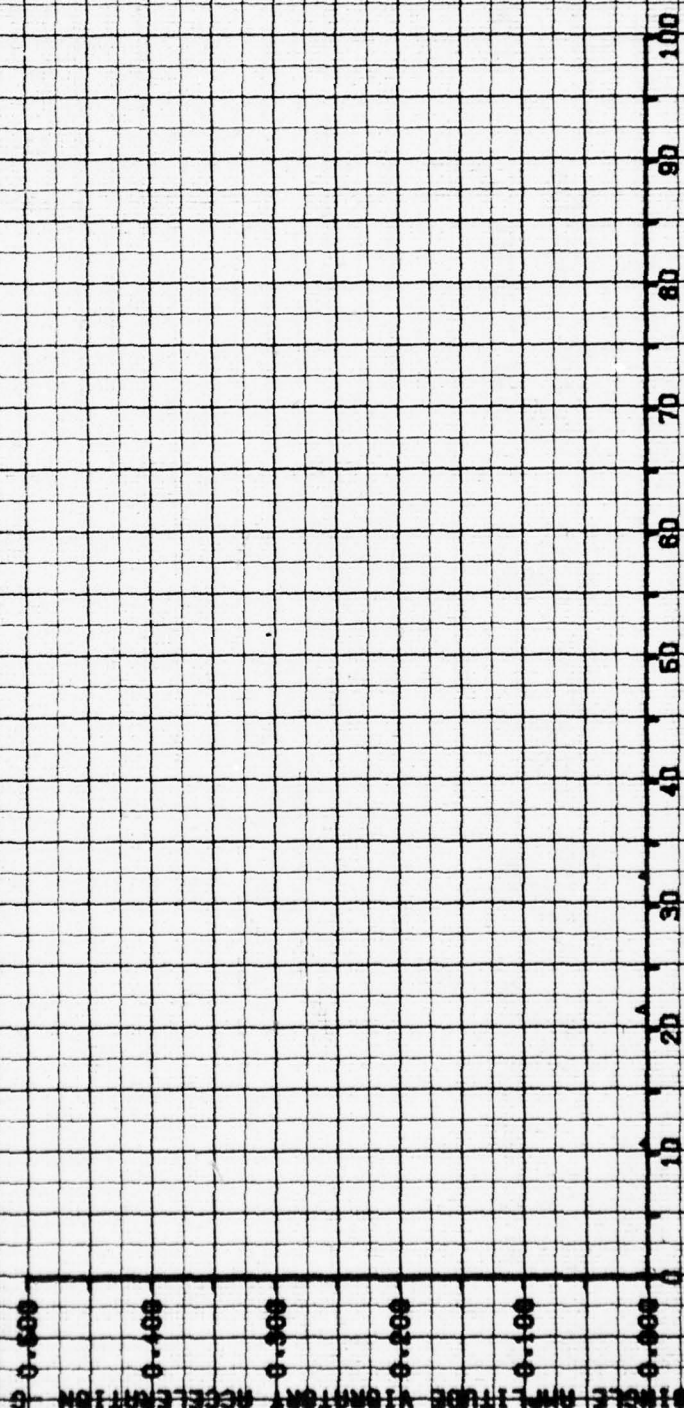


FIGURE 60

VIBRATION CHARACTERISTICS

LOCATION: POWER CONVERTER	NUM-1H	USA 8/N	86-60869	FUNDAMENTAL FREQUENCY IS 5.10 HZ
AXIS: VERTICAL				
GRADE: LONG	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.
WEIGHT: CG F8	ALTITUDE	TEMPERATURE	SPEED	FLIGHT CONFIGURATION
-IN.	-FT	-DEG C	-RPM	AIRSPED
8900	134.2 (FWD)	0.0 (MID)	324.0	-KTS
			15.0	LEVEL
				CLEAN

FLT 3
 TRK 8
 VCD 55
 HRS 7
 MIN 54
 SEC 55
 GRP 0

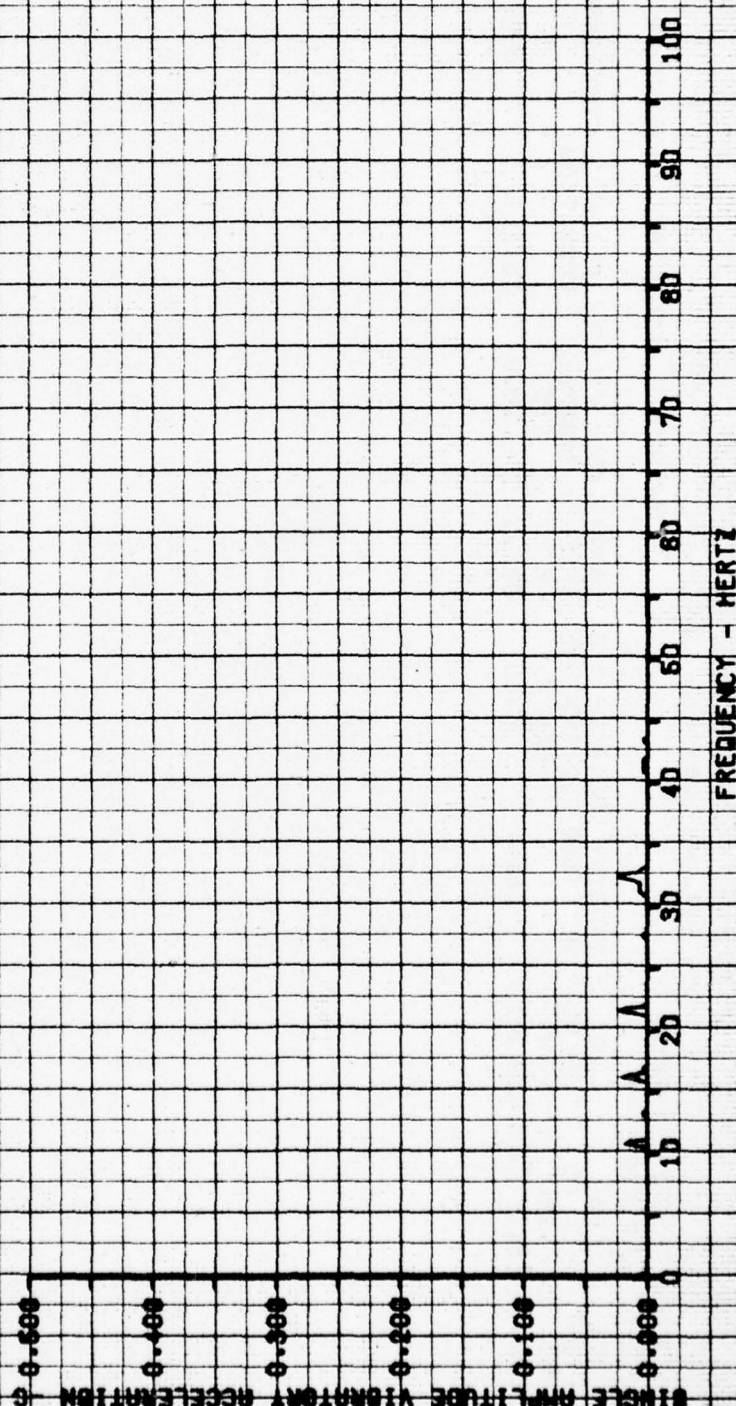


FIGURE 61

VIBRATION CHARACTERISTICS

LOCATION	COLLECTIVE CONTROL	NUM-1H	USA S/N	88-50869	FUNDAMENTAL FREQUENCY IS 5.10 HZ
AXIS	VERTICAL				
GROSS WEIGHT	LONG	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.
-LB	CG FS	ALTITUDE	TEMPERATURE	SPEED	FLIGHT CONFIGURATION
	-IN.	-FT	-DEG C	-RPM	CONDITION
B900	134.2 (FWD)	0.0 (MID)	8.0	324.0	16.0
				LEVEL	CLEAN

SINGLE AMPLITUDE VIBRATION ACCELERATION

FREQUENCY - HERTZ

FL 3
TRK 7
VCO 25
HRS 7
MIN 54
SEC 00
DAY 0

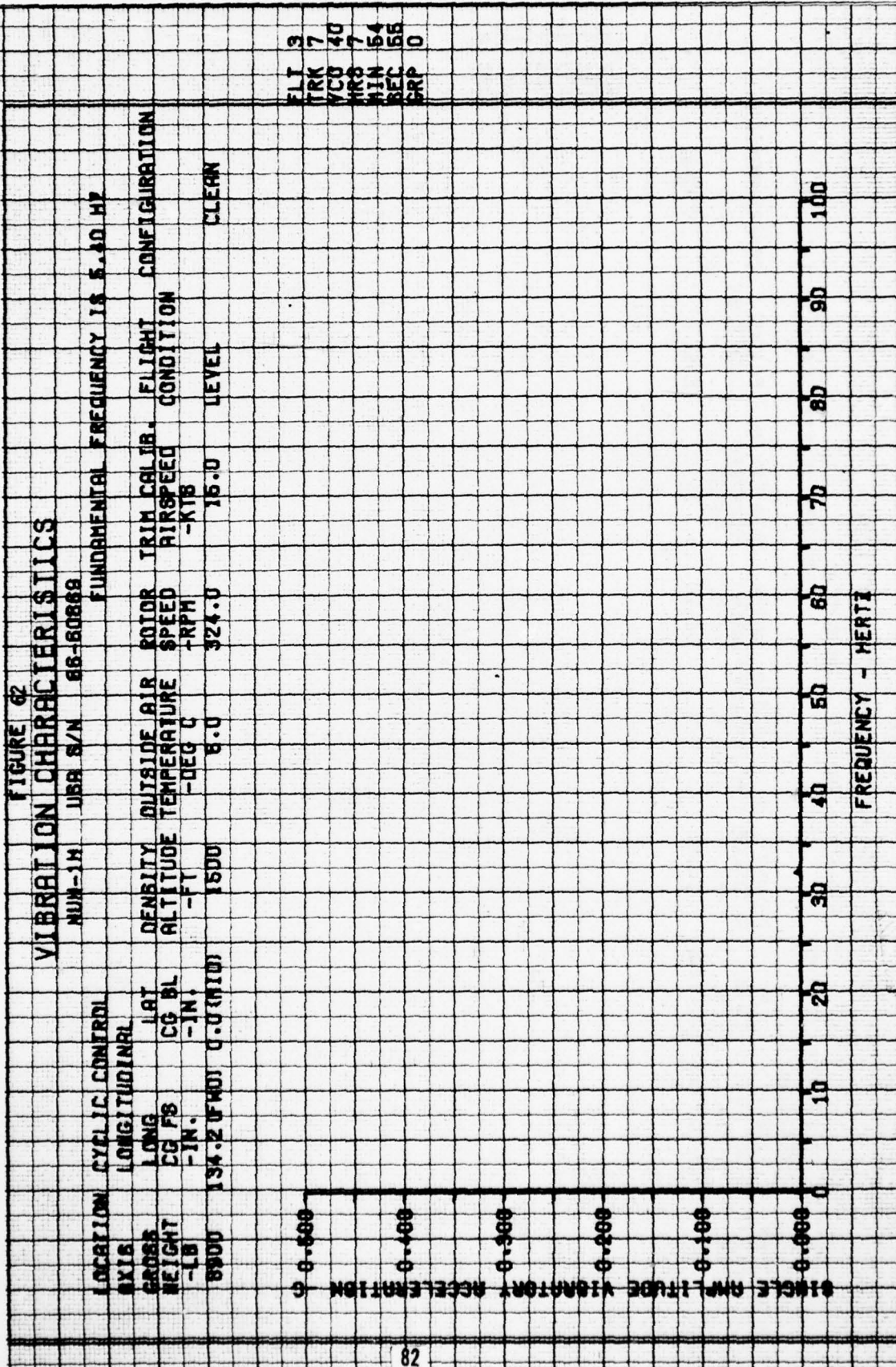


FIGURE 63
VIBRATION CHARACTERISTICS

LOCATION	CYCLIC CONTROL	NUH-1H	USA S/N	66-60869	FUNORMENTAL FREQUENCY IS 5.40 MHZ
AXIS	LATERAL				
CROSS	LONG				
WEIGHT	CQ FS				
-LB	-IN.				
		DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB
		ALTITUDE	TEMPERATURE	SPEED	AIR SPEED
		-FT	-DEG C	-RPM	-KTS
		1500	5.0	324.0	15.0
					LEVEL
					CLEAN
8900	134.2 (FWD)	0.0 (MID)			

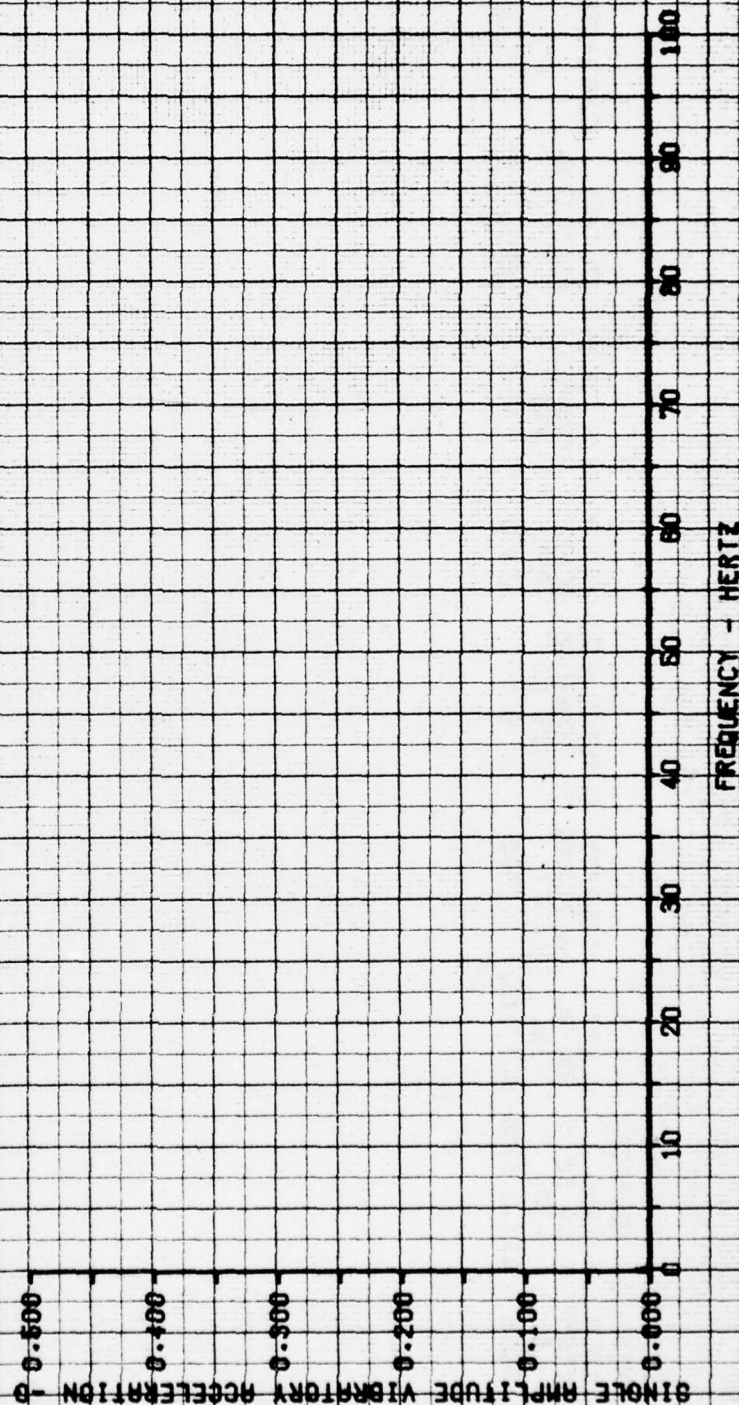


FIGURE 6A

VIBRATION CHARACTERISTICS

LOCATION FORWARD PALLET FLOOR MOUNT
 AXIS VERTICAL
 CROSS LONG
 HEIGHT 8900
 -LB 134.2 (FWO) 0.0 (MID)
 LAT 0.0 (MID)
 CG BL -IN.
 DENSITY 1500
 OUTSIDE AIR 6.0
 ALTITUDE TEMPERATURE -DEG C
 ROTOR SPEED 324.0
 -RPM
 TRIM CALIB 15.0
 FLIGHT CONDITION LEVEL
 CONFIGURATION CLEAN

NUN-1H USA S/N 66-60869
 FUNDORMENTAL FREQUENCY IS 5.40 HZ

SINGLE AMPLITUDE VIBRATION ACCELERATION
 0.500
 0.400
 0.300
 0.200
 0.100
 0.000

FREQUENCY - HERTZ

100

90

80

70

60

50

40

30

20

10

0

FLT 3
 TRK 7
 VCD 70
 HRS 7
 MIN 54
 SEC 55
 DRP 0

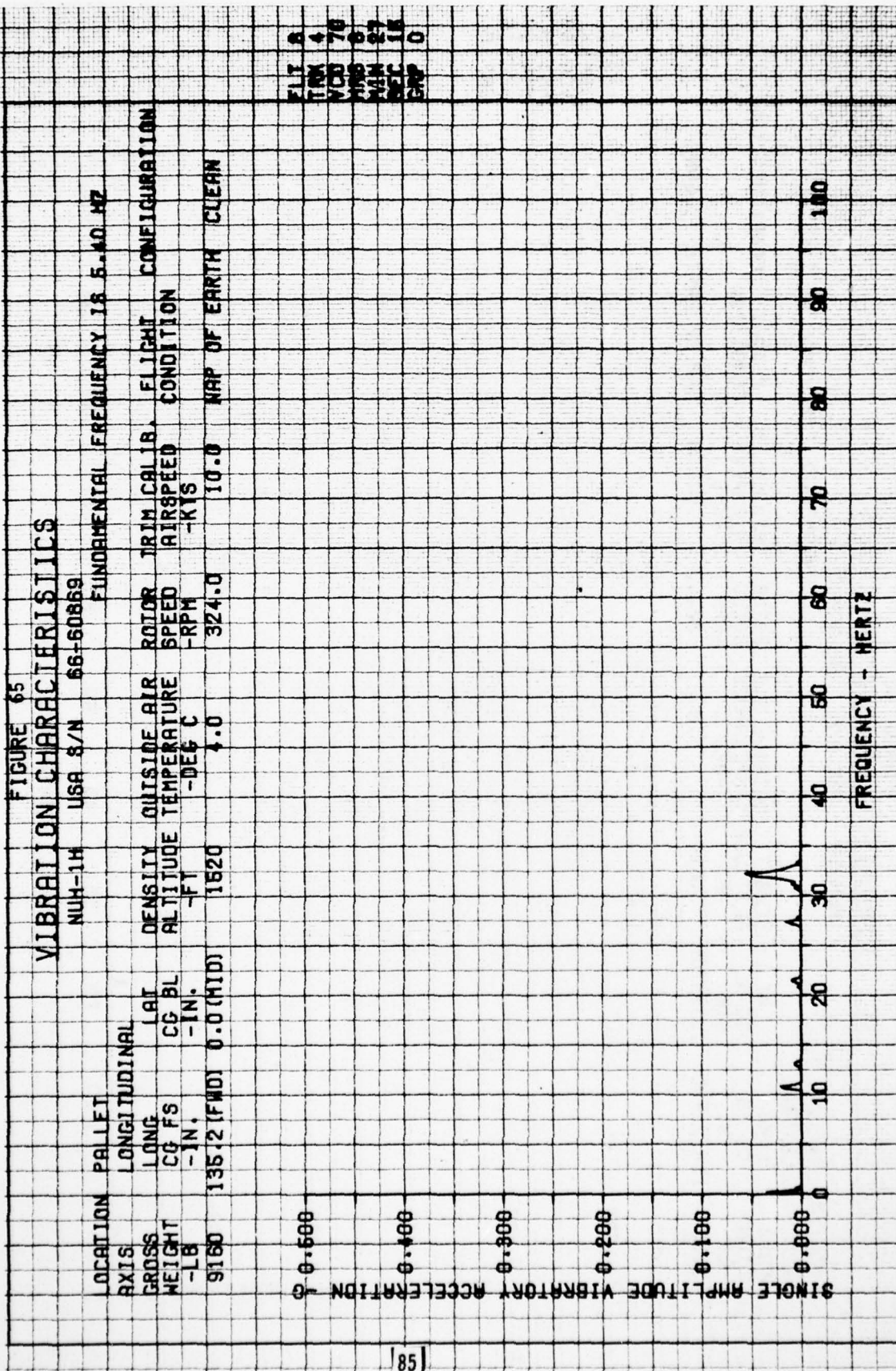


FIGURE 86

VIBRATION CHARACTERISTICS

NUM-1H USA 8/N 66-60869
FUNDAMENTAL FREQUENCY IS 5.40 HZ

LOCATION	PALLET	DENSITY	OUTSIDE AIR	ROTOR	TRIM	CALIB.	FLIGHT	CONFIGURATION
AXIS	LATERAL	ALTITUDE	TEMPERATURE	SPEED	AIR	SPEED	CONDITION	
CROSS	LONG	-FT	-DEG C	-RPM	-KTS			
WEIGHT	CG FB							
-LB	-IN.							
9180	136.2 (FWD)	0.0 (MID)	4.0	324.0	10.0	MAP OF EARTH	CLEAN	

SINGLE AMPLITUDE VIBRATION ACCELERATION

FREQUENCY - HERTZ

FLT 8
TRK 4
VCO 86
MRS 8
MIN 27
SET 15
GRP 0

FIGURE 67

VIBRATION CHARACTERISTICS

NUH-1H USA 2/N 66-60858

FUNDAMENTAL FREQUENCY IS 5.40 HZ

LOCATION PALLET
AXIS VERTICAL

CROSS
WEIGHT
-LB

9160 135.2 (FWD)

LAI

CG BL

-IN.

DENSITY

1620

ALTIITUDE

4.0

ROTOR

324.0

OUTSIDE AIR

10.0

TEMPERATURE

WAP OF EARTH

SPEED

CLEAN

CONDITION

FLIGHT

CONFIGURATION

TRIM CALIB.

SINGLE AMPLITUDE VIBRATORY ACCELERATION

0.500

0.400

0.300

0.200

0.100

0.000

FREQUENCY - HERTZ

10

20

30

40

50

60

70

80

90

100

FLT 2
TRIM 4
VCS 100
WAS 0
MIN 27
MAX 15
EXP 0

FIGURE 68

VIBRATION CHARACTERISTICS

LOCATION	PILOT SEAT	NUH-1H	USA S/N	66-60869	FUNDAMENTAL FREQUENCY IS	5.40 HZ
AXIS	LONGITUDINAL					
CROSS						
WEIGHT	CG FS	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.	FLIGHT CONFIGURATION
-LB	-IN.	CG 3L	TEMPERATURE	SPEED	AIR SPEED	CONDITION
		-IN.	-DEG C	-RPH	-KTS	
9180	135.2 (FWD)	0.0 (HID)	1520	4.0	324.0	10.0
						NAP OF EARTH
						CLEAN

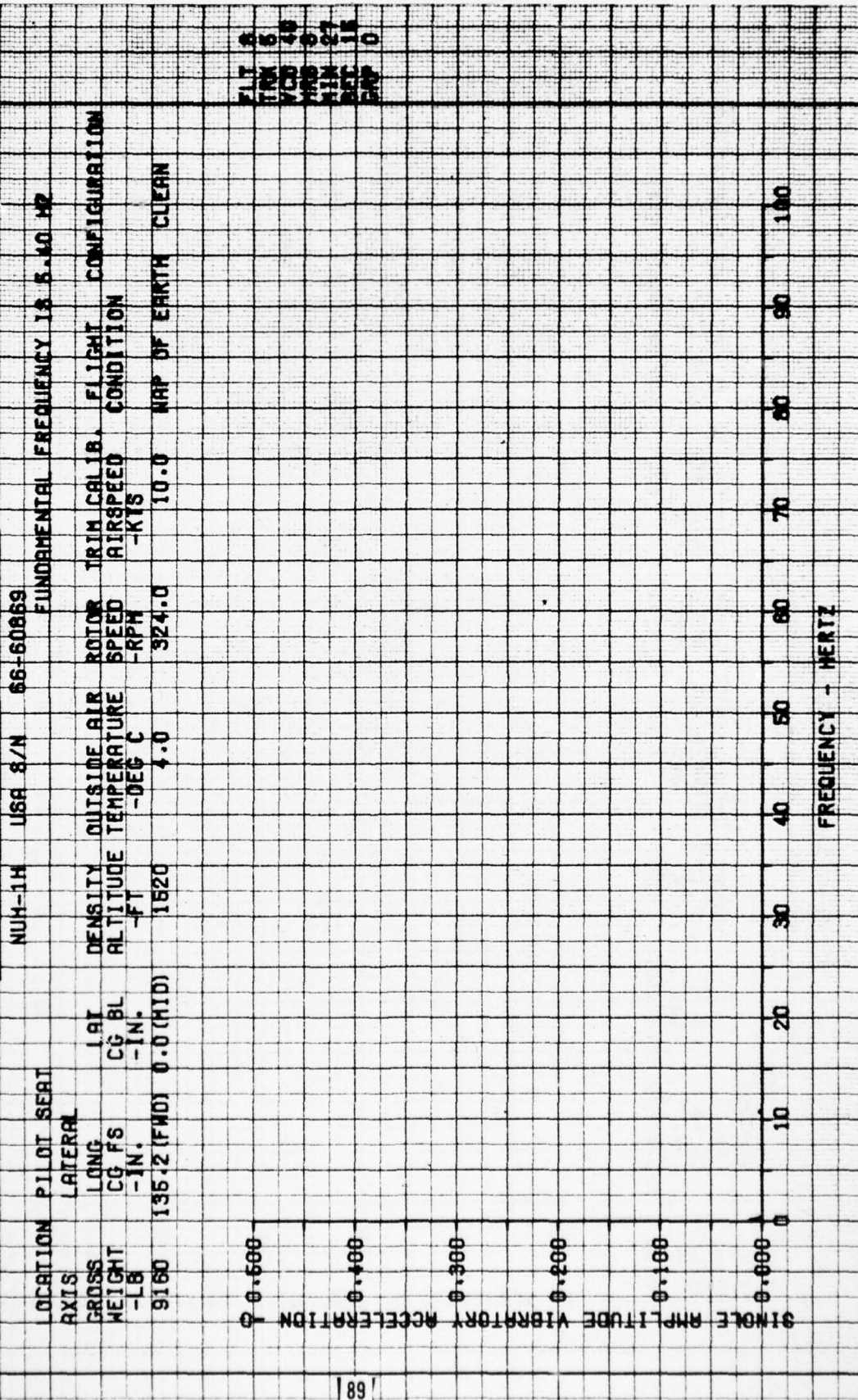
SINGLE AMPLITUDE VIBRATION ACCELERATION

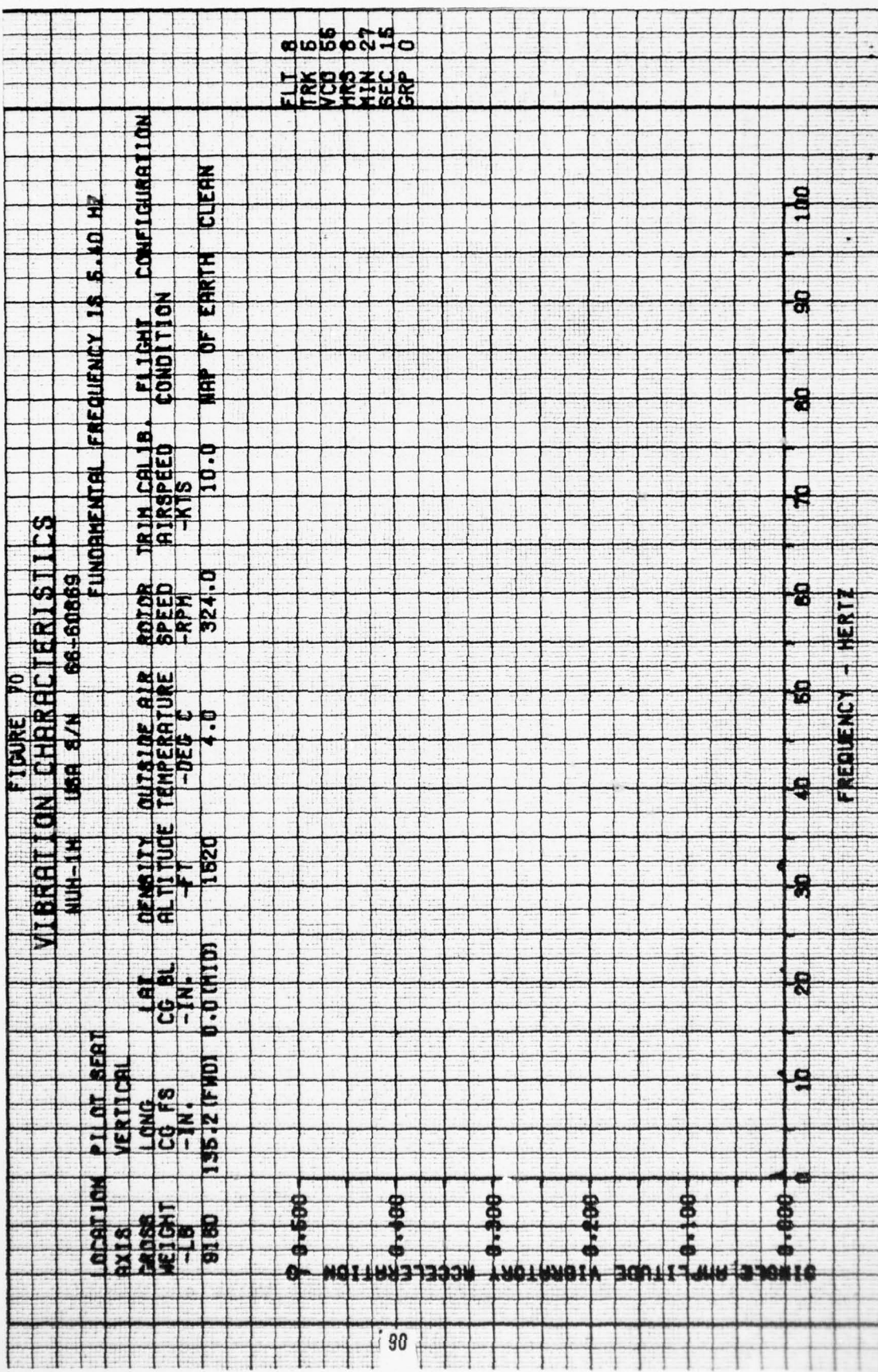
FREQUENCY - HERTZ

FLT 8
TRK 5
VCO 26
HRS 8
MIN 27
SEC 15
GRP 0

FIGURE 69

VIBRATION CHARACTERISTICS





FLT 8
 TRK 6
 VCD 56
 HRS 8
 MIN 27
 SEC 15
 GRP 0

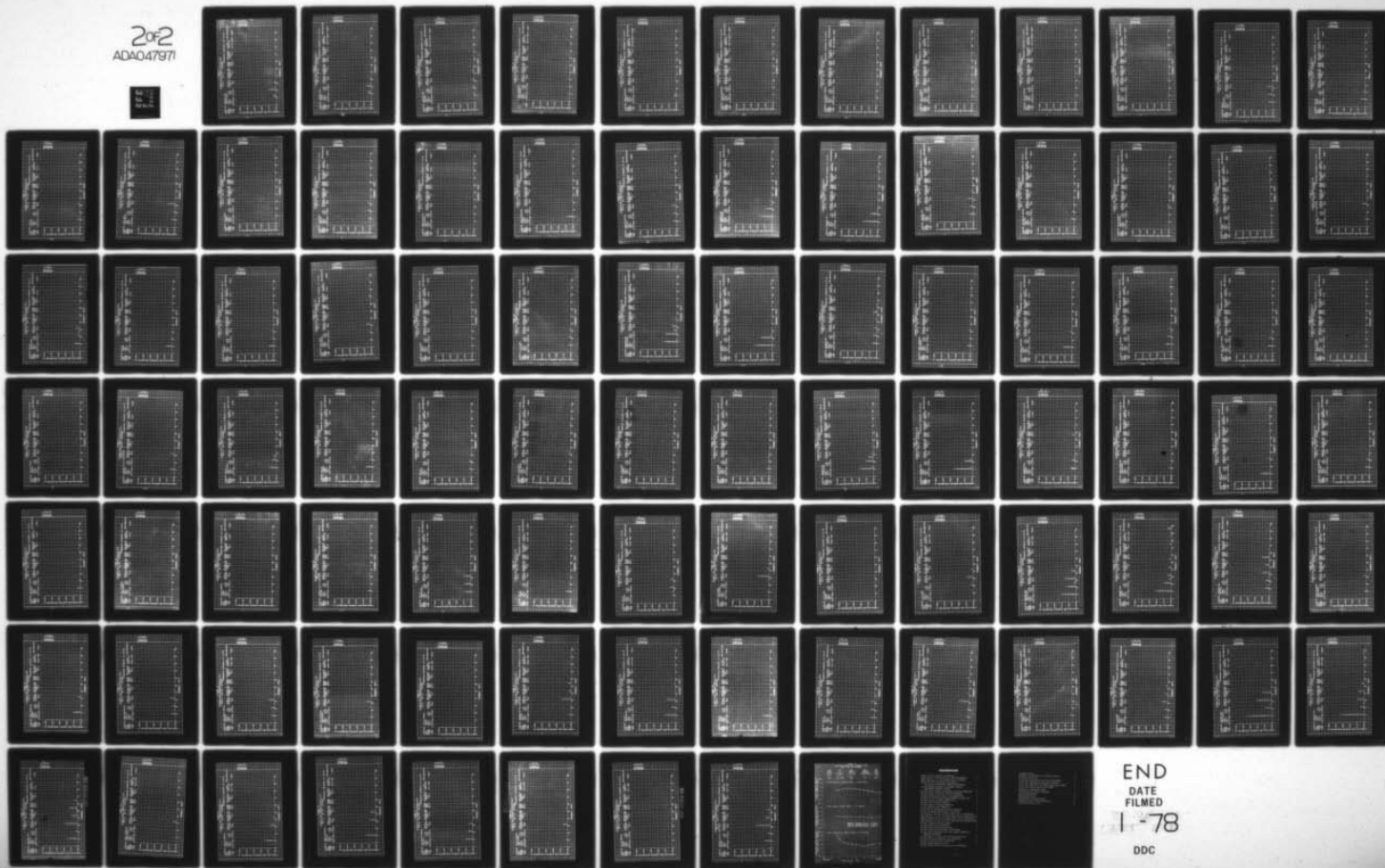
AD-A047 971

ARMY AVIATION ENGINEERING FLIGHT ACTIVITY EDWARDS AF--ETC F/G 1/3
AIRWORTHINESS EVALUATION NUH-1H HELICOPTER WITH GLOBAL POSITION--ETC(U)
MAY 77 C L THOMAS, T P BENSON
USAAEFA-76-13

UNCLASSIFIED

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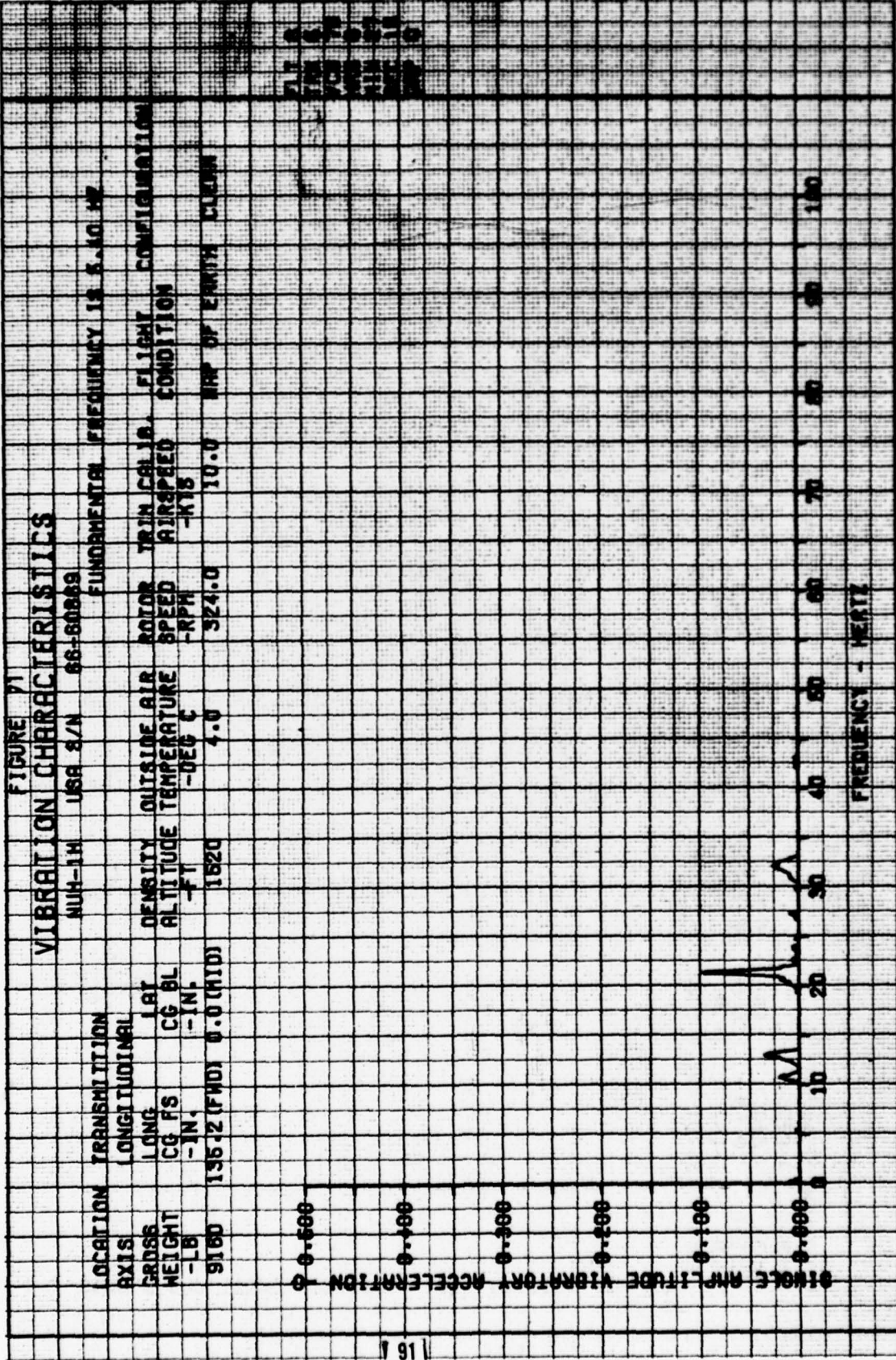
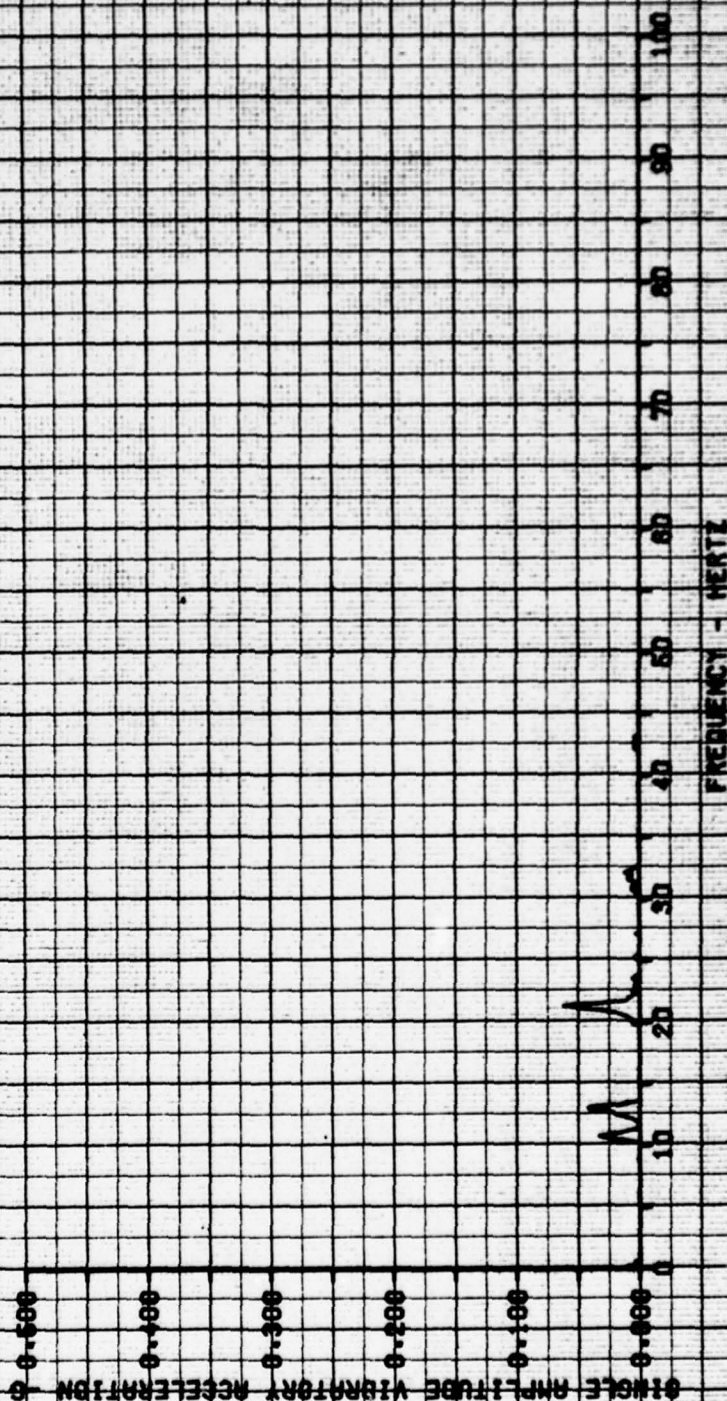


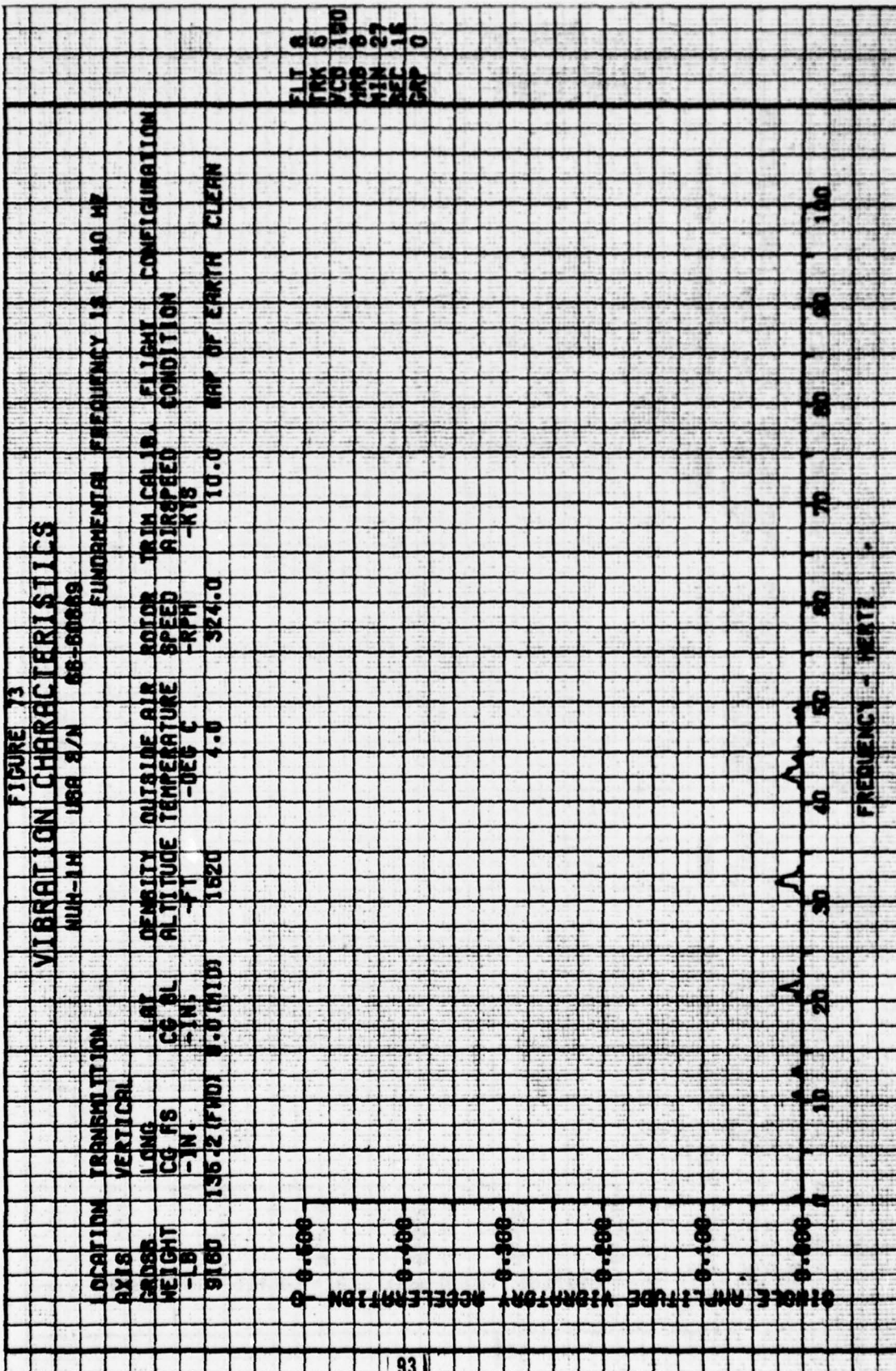
FIGURE 72

VIBRATION CHARACTERISTICS

LOCATION	TRANSITION	WIND-1M	USA S/N	68-60069	FUNDAMENTAL FREQUENCY IS 5.10 MP
AXIS	LATERAL				
CGSS	LONG	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.
HEIGHT	CG FS	ALTITUDE	TEMPERATURE	SPEED	FLIGHT CONDITION
-LB	-IN.	-FT	-DEG C	-RPM	-KTS
9180	136.2 (FWD)	0.0 (MID)	4.0	324.0	10.0
					MAP OF EARTH CLEAN

FLT 8
TRK 5
VCS 86
WBS 8
MIN 27
SEC 15
DTP 0





FLT 8
 TRK 6
 VCD 150
 MRS 0
 MIN 27
 REC 15
 GRP 0

FIGURE 74
VIBRATION CHARACTERISTICS

POWER CONVERTER	WIND-1H	USE E/N	AS-60213	FUNDAMENTAL FREQUENCY IS 5.10 MZ	
LONGITUDINAL					
CG FS	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.	FLIGHT CONFIGURATION
-IN-	ALTITUDE	TEMPERATURE	SPEED	AIRSPED	CONDITION
	-FT	-DEG C	-RPM	-KTS	
155-2 (FWD)	1820	4.0	324.0	10.0	MAP OF EARTH CLEAN

SECRET

SINGLE AMPLITUDE VIBRATION MECELENTION

	001.0	002.0	003.0	004.0	005.0	006.0
007.0						
008.0						
009.0						
010.0						
011.0						
012.0						
013.0						
014.0						
015.0						
016.0						
017.0						
018.0						
019.0						
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081.0						
082.0						
083.0						
084.0						
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087.0						
088.0						
089.0						
090.0						
091.0						
092.0						
093.0						
094.0						
095.0						
096.0						
097.0						
098.0						
099.0						
100.0						

FREQUENCY - FIFTY

VIBRATION CHARACTERISTICS

FIGURE 75

OPTION POWER CONVERTER	NUH-1H	U56 8/8	66-60859	FUNDAMENTAL FREQUENCY 14.5-10.42
------------------------	--------	---------	----------	----------------------------------

0.500 0.000 0.000 0.000 0.000 0.000

FREQUENCY - HERTZ

FLT	8	6	40	8	27	15	0
TRK							
VCO							
INOS							
MIN							
SEC							
SWP							

FIGURE 7b

VIBRATION CHARACTERISTICS

LOCATION	POWER CONVERTER	NUM-14	158 2/N	66-80863	FUNDAMENTAL FREQUENCY IS 5.40 HZ
AXIS	VERTICAL	DENSITY	OUTSIDE AIR	ROTOR TRIM CALIB.	FLIGHT CONFIGURATION
COORDS	LONG	ALTITUDE	TEMPERATURE	SPEED	AIRSPED CONDITION
WEIGHT	CG F8	-FT	-DEG C	-RPM	-KTS
-LB	-IN.	1820	4.0	324.0	10.0
					MAP OF EARTH CLEAN
9160	135.2 (FWD)	0.0 (H/D)			

ZLT 8
TRK 6
VCS 66
HRS 8
MIN 27
SEC 15
GRP 0

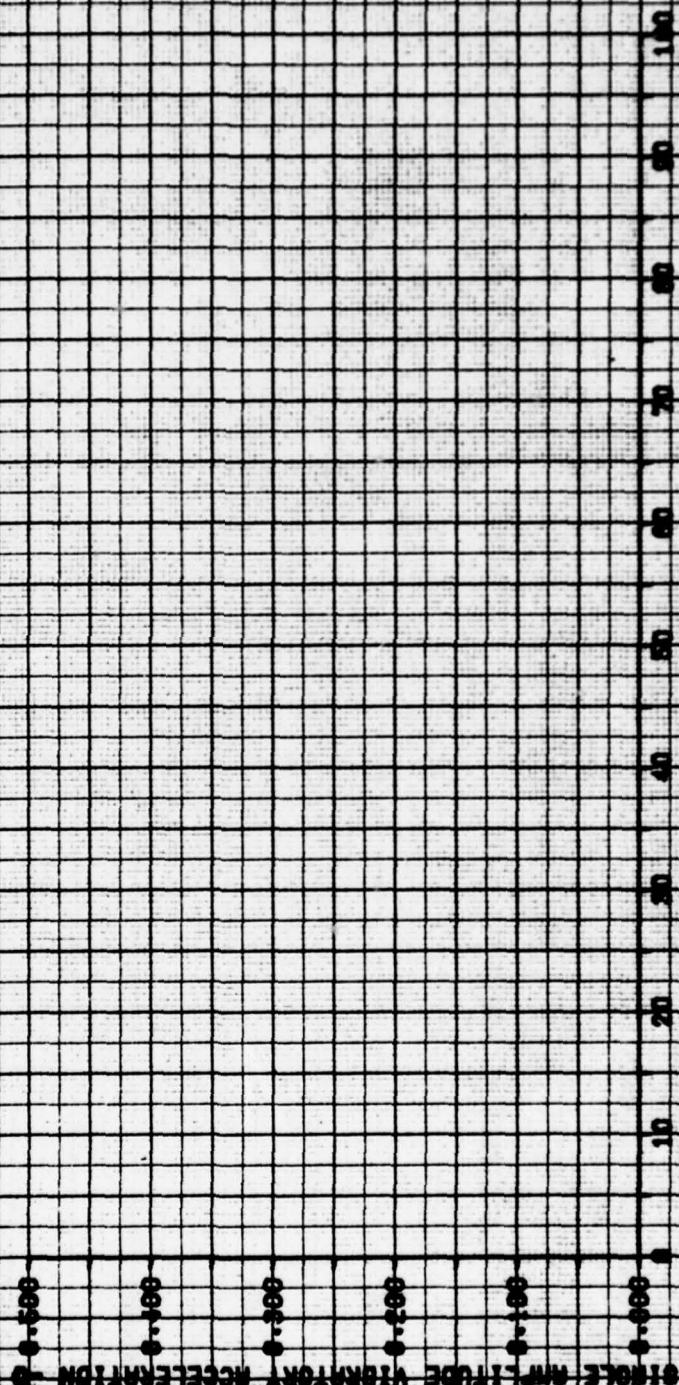
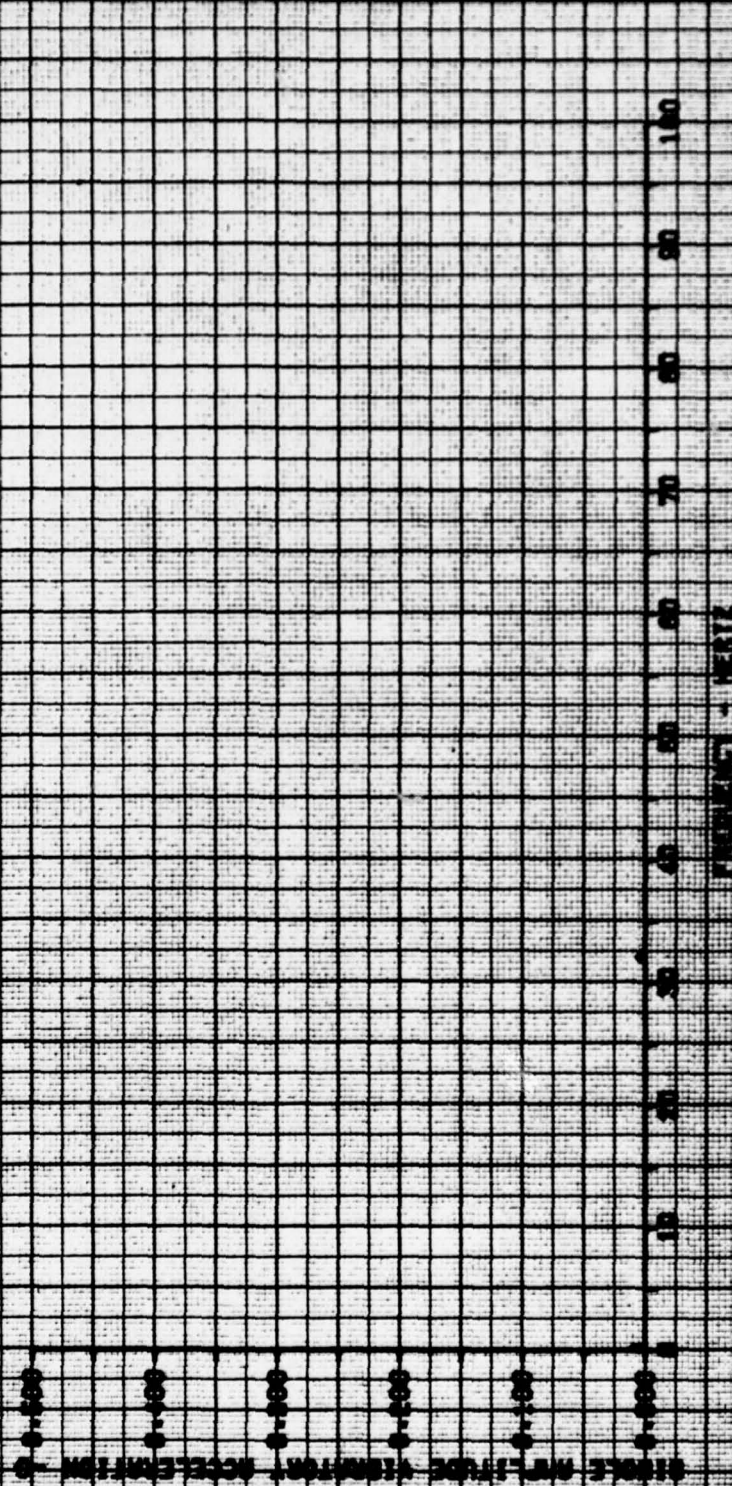


FIGURE 78

VIBRATION CHARACTERISTICS

MODEL	155-2 (PMD)	0.00100	1000	4.0	324.0	10.0	MAP OF EARTH	CLEAN
WEIGHT	-LB							
CO. FS	-IN.							
CO. SL	-IN.							
LONG								
LONGITUDINAL								
CYCLIC CONTROL								
UNIT								
DENSITY								
OUTSIDE AIR								
ROTOR								
SPEED	-RPM							
TEMPERATURE	-DEG C							
ALTITUDE	-FT							
TRIM	CG 1.0							
FLIGHT								
CONFIGURATION								
FUNDAMENTAL FREQUENCY	IS 5.10 HZ							

FLT 8
TRX 7
VCD 48
HRS 8
MIN 27
SEC 18
DOP 0



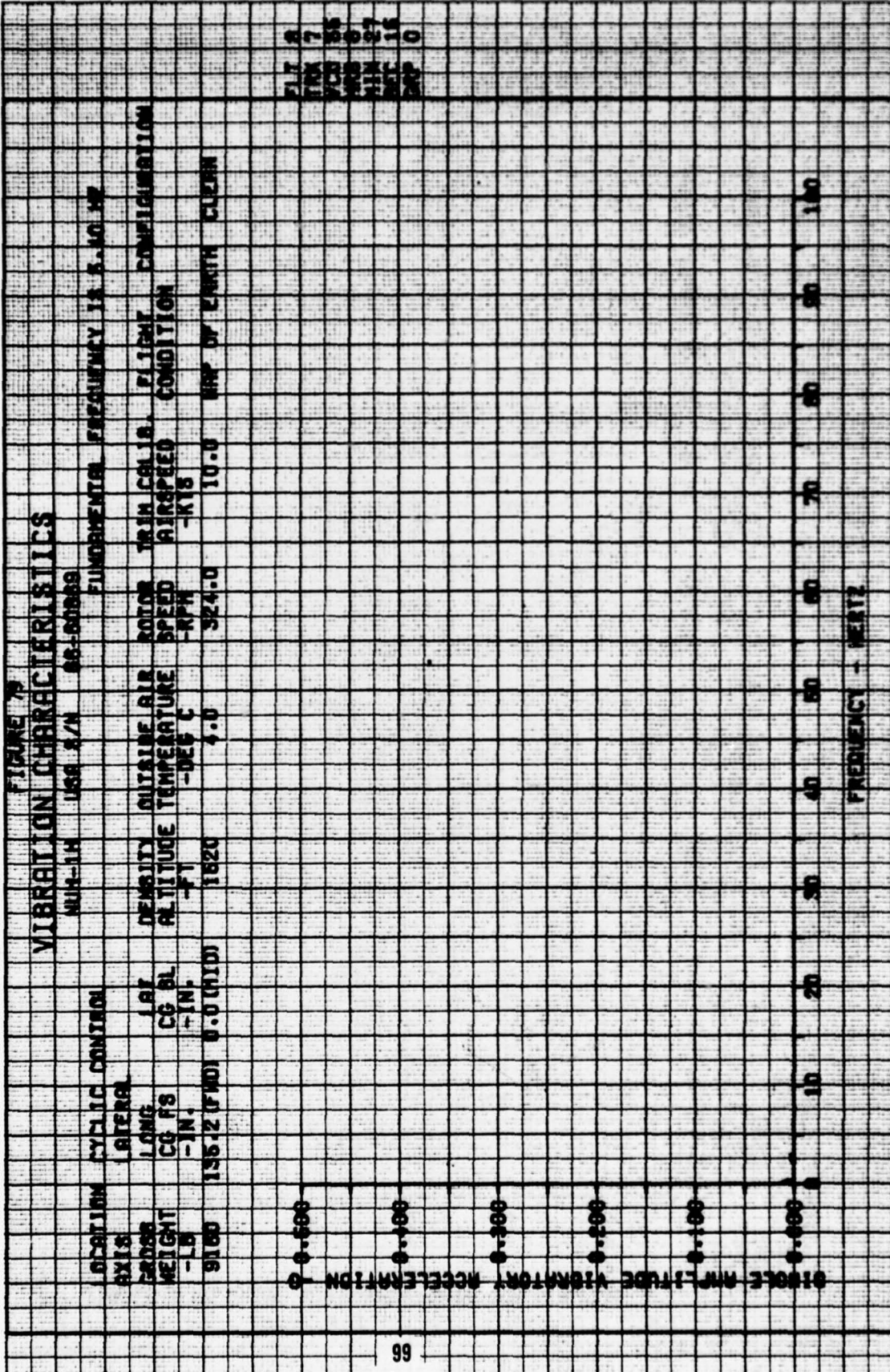
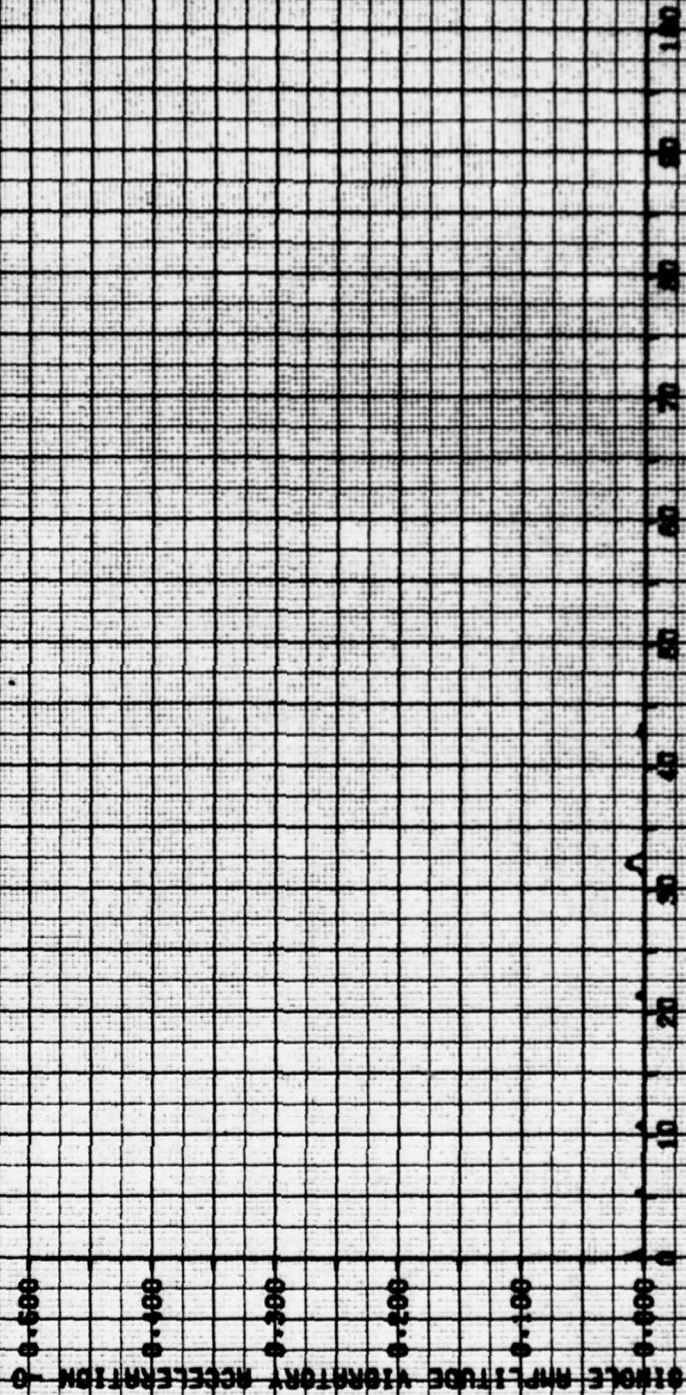


FIGURE 80

VIBRATION CHARACTERISTICS

LOCATION FORWARD PALLET FLOOR MOUNT
 AXIS VERTICAL
 GROSS WEIGHT 9180 LB
 CG FS 135.2 (FWD) 0.0 (AID)
 CG BL -IN.
 LAT 1820
 DENSITY 1820
 ALTITUDE TEMPERATURE -100 F
 OUTSIDE AIR SPEED 324.0 KTS
 MOTOR TRIM CALIB. 10.0
 FLIGHT CONDITION
 CONFINEMENT
 FREQUENCY 10.0 HZ OF ZEMIN CLEAN



21.8
 21.8
 21.8
 21.8
 21.8

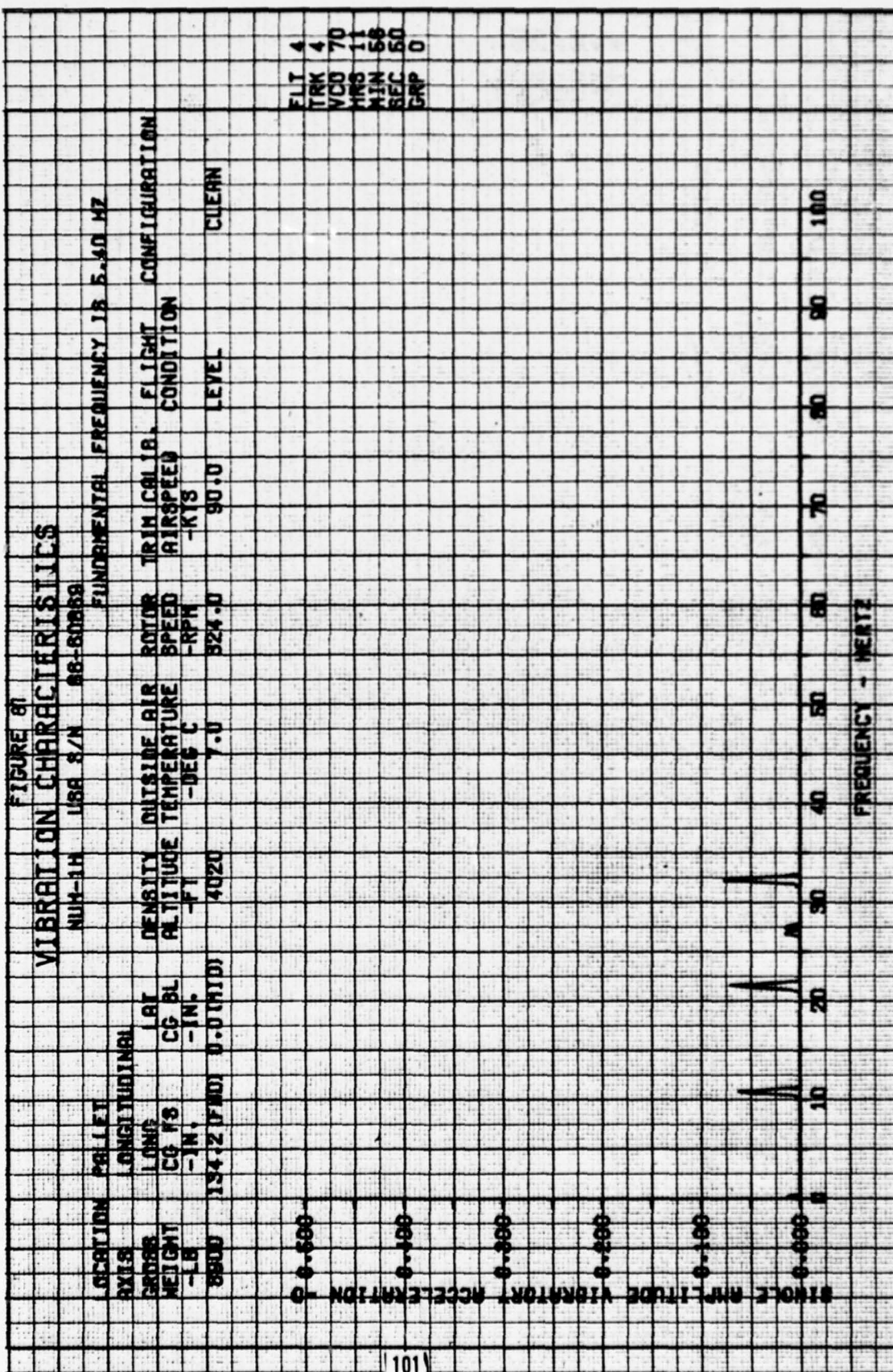


FIGURE 82

VIBRATION CHARACTERISTICS

NUM-14 USE 2/N 86-60863

FUNDAMENTAL FREQUENCY IS 5.40 HZ

LOCATION PALLET
DATA LATERAL

LONGS

CG #8

-IN.

134.2 (FND) 0.0 (HYD)

LAT

CG #1

-IN.

4020

DENSITY

OUTSIDE AIR

TEMPERATURE

-DEG C

ROTOR

SPEED

-RPM

824.0

TRIM CAN 18

FLIGHT

CONDITION

CLEAN

AIR SPEED

-KTS

80.0

LEVEL

LEVEL

LEVEL

LEVEL

LEVEL

0.500

0.400

0.300

0.200

0.100

0.050

0.025

0.0125

0.00625

0.003125

0.0015625

0.00078125

0.000390625

0.0001953125

0.00009765625

0.000048828125

0.0000244140625

0.00001220703125

0.000006103515625

0.0000030517578125

0.00000152587890625

0.000000762939453125

0.0000003814697265625

0.00000019073486328125

0.000000095367431640625

0.0000000476837158203125

0.00000002384185791015625

0.000000011920928955078125

0.0000000059604644775390625

0.00000000298023223876953125

0.000000001490116119384765625

0.0000000007450580596923828125

0.00000000037252902984619140625

0.000000000186264514923095703125

0.0000000000931322574615478515625

FLT 4

TRK 4

VCD 85

HRS 11

MIN 56

SEC 50

GRP 0

FREQUENCY - HERTZ

FIGURE 83 VIBRATION CHARACTERISTICS

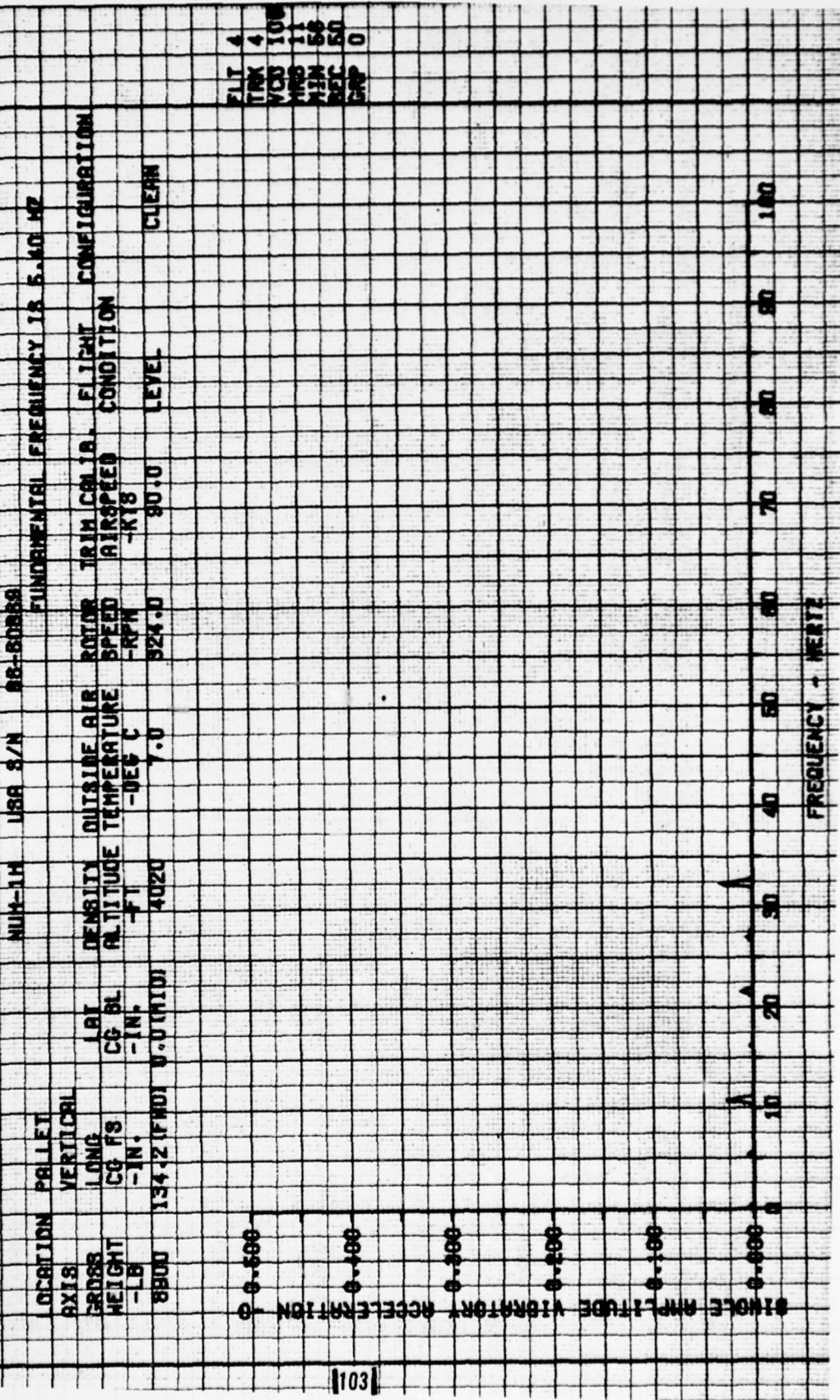
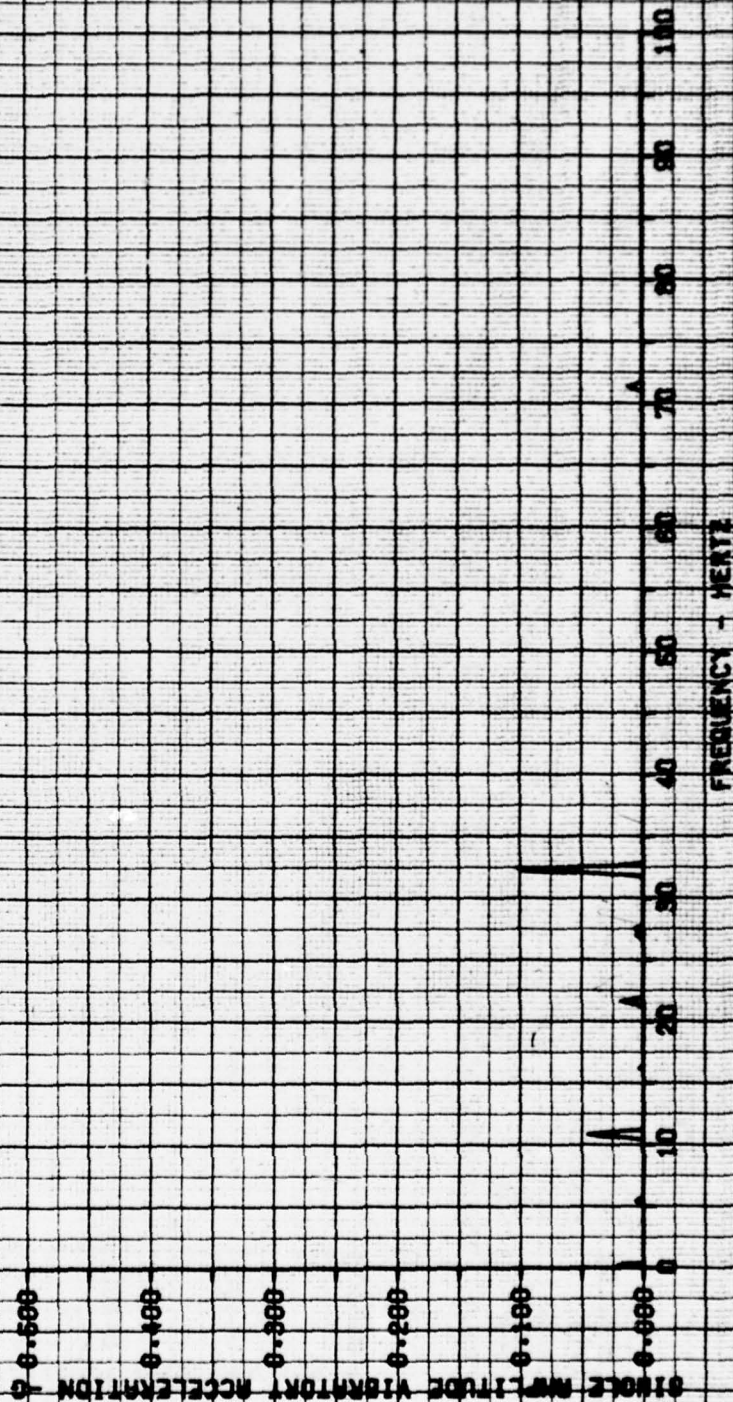


FIGURE 8A

VIBRATION CHARACTERISTICS

LOCATION	PILLOT SEAT	NUM-14	USE 2/N	56-80868	FUNDAMENTAL FREQUENCY 14 5.40 HZ
AXIS	LONGITUDINAL	DENSITY	OUTSIDE AIR	ROTOR	TRIM CAL 18. FLIGHT CONFIGURATION
WEIGHT	LONG	ALTITUDE	TEMPERATURE	SPEED	AIR SPEED CONDITION
-LB	-IN.	-FT	-DEG C	-RPM	-KTS
8900	134.2 (FWD)	4020	7.0	824.0	80.0
	CG BL				LEVEL
	-IN.				CLEAN
	0.0 (MID)				

FLY 4
TRK 5
VCO 26
HRS 11
MIN 58
SEC 58
DAY 0



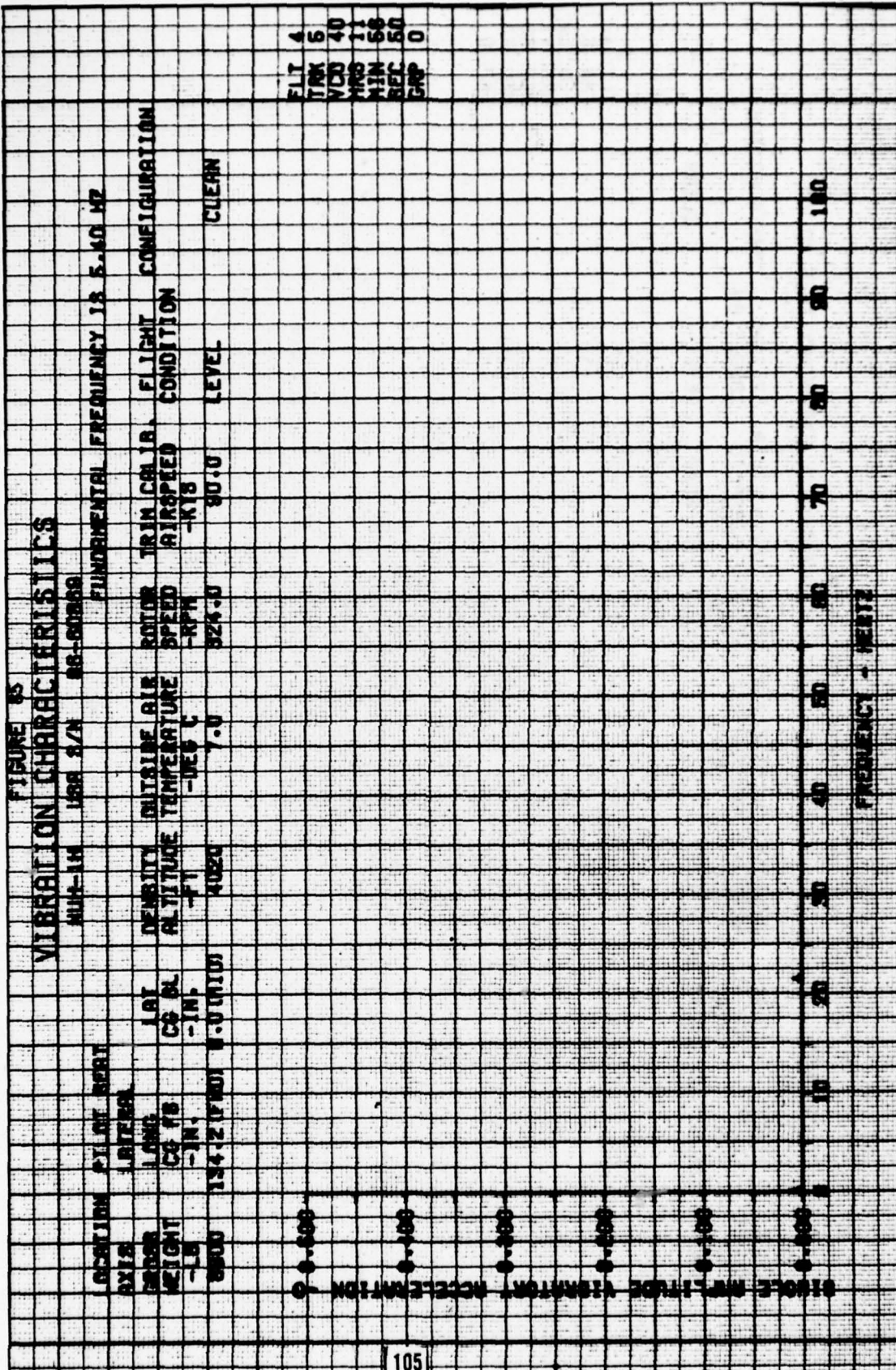


FIGURE 87

VIBRATION CHARACTERISTICS

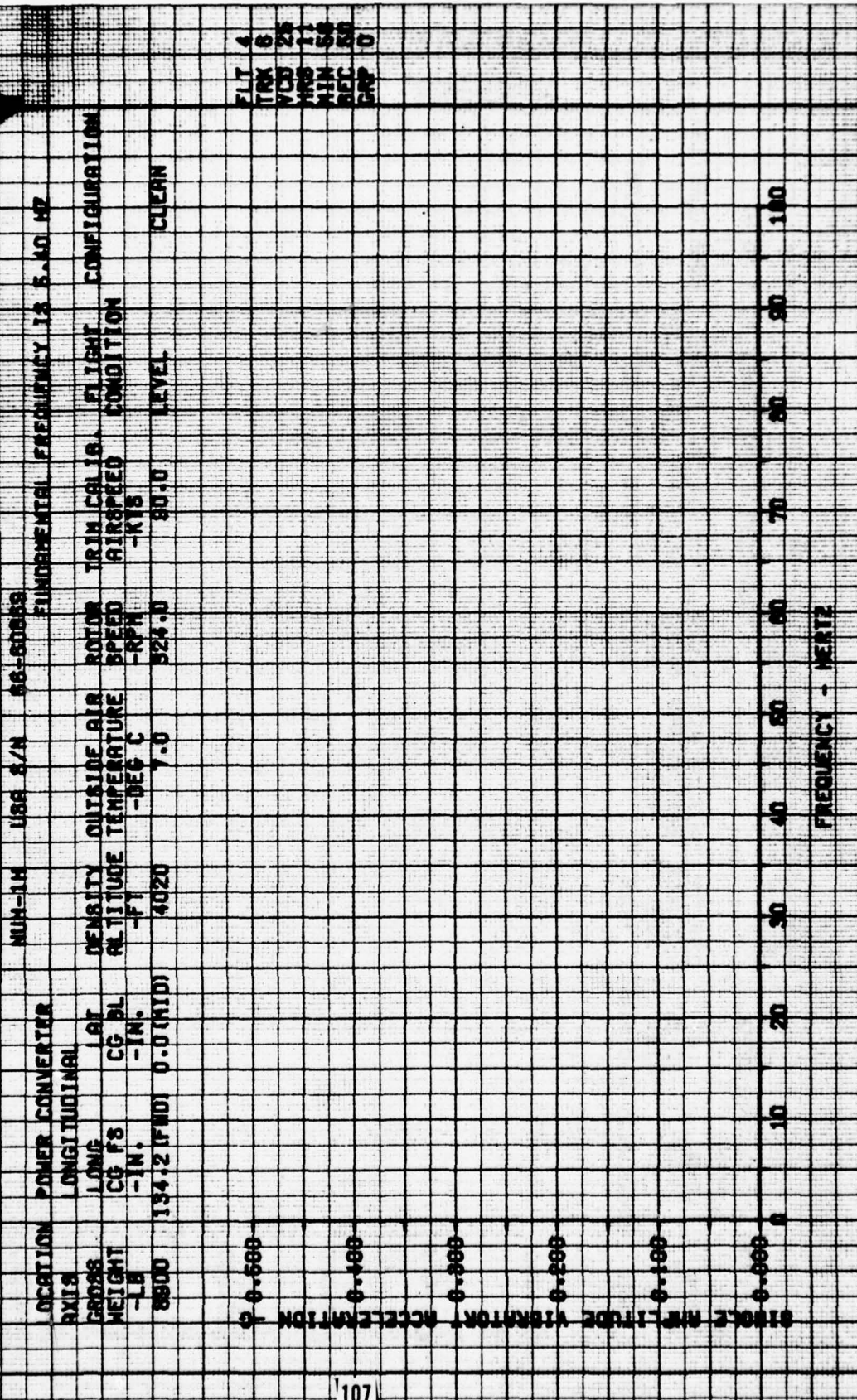
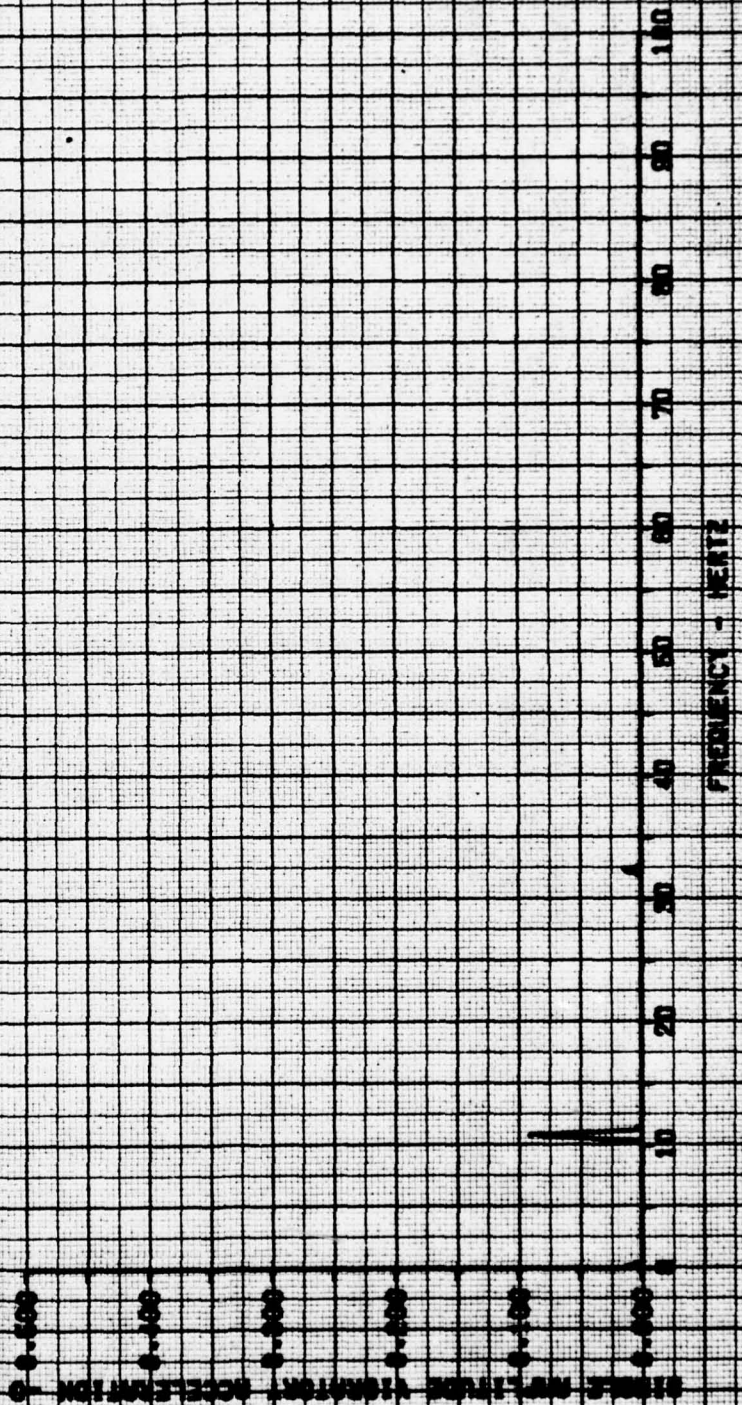


FIGURE 85 VIBRATION CHARACTERISTICS

NUK-1A USA 3/N 66-60868
 FUNDAMENTAL FREQUENCY 12.5-40 HZ
 LOCATION POWER CONVERTER
 DIRS LATERAL
 LONG CO FB
 LAT CG BL
 ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION
 -FT -DEG C -RPM -KTS
 4020 7.0 324.0 80.0 LEVEL CLEAN
 134.2 (740) 0.0 (110)

FLT 4
 TRK 6
 VCS 40
 HRS 11
 MIN 56
 SEC 50
 SWP 0



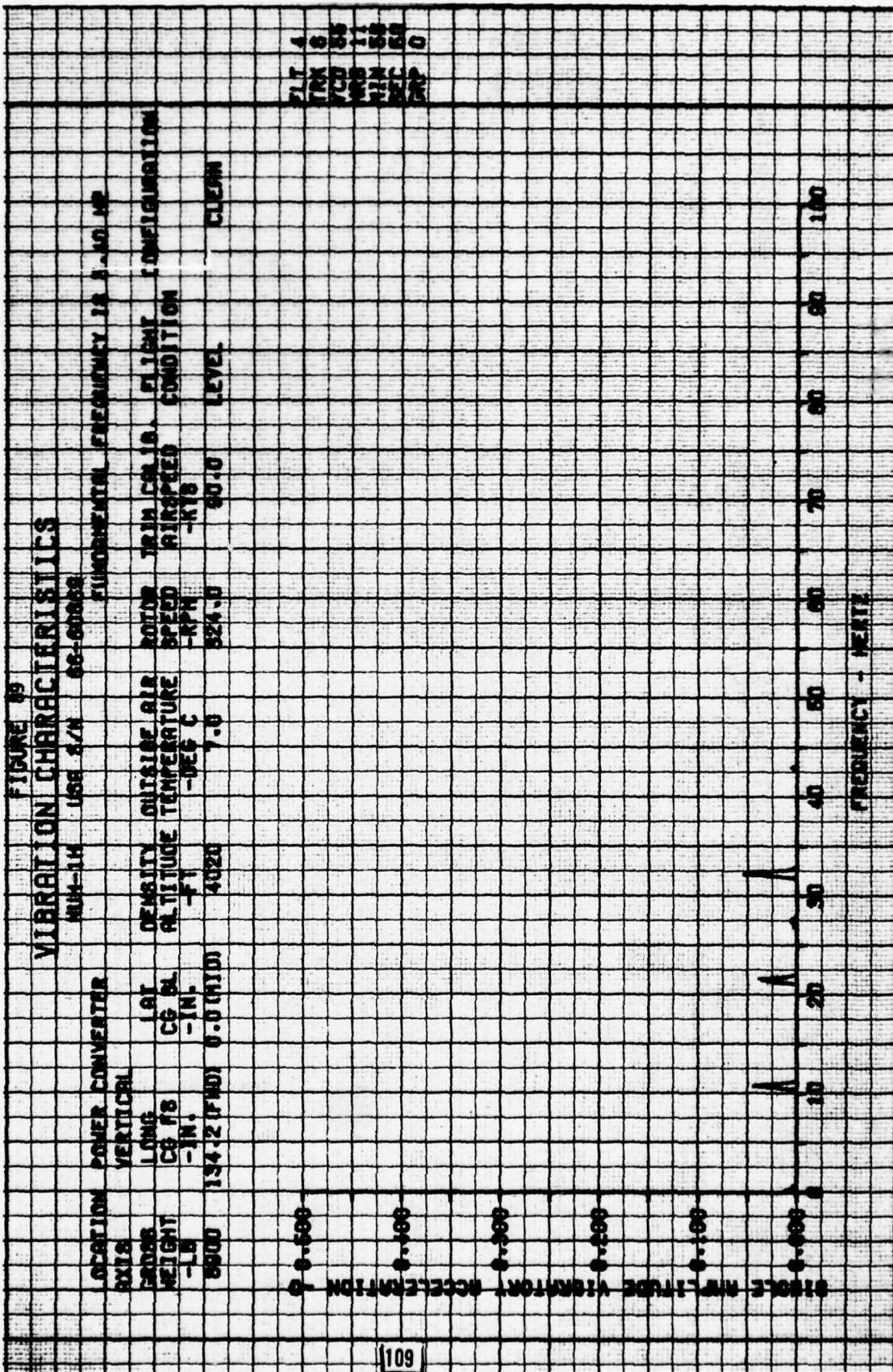


FIGURE 10

VIBRATION CHARACTERISTICS

W4-14 100 S/N 80-00000

FUNDAMENTAL FREQUENCY IS 5.40 MZ

TESTING TRANSDUCER

TYPE LONGITUDINAL

MODEL 100

WEIGHT 100 LB

COIL 100 LB

COIL 100 LB

COIL 100 LB

COIL 100 LB

COIL 100 LB

COIL 100 LB

COIL 100 LB

COIL 100 LB

COIL 100 LB

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COIL 100 LB

DENSITY OUTSIDE AIR ROTOR TRIM CALIB. FLIGHT CONFIGURATION

ALTITUDE TEMPERATURE SPEED RUNSPEED CONDITION

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

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-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

-1000 7.0 324.0 80.0 LEVEL CLEAN

FLT 4
TAX 5
VCD 70
HWS 11
MIN 50
SEC 50
CAP 0

FREQUENCY - HERTZ

FIGURE 9
VIBRATION CHARACTERISTICS

FLAME

STATION TRANSMISSION
444-144 URG 8/4 05-00000
FUNDAMENTAL FREQUENCY IS 3.10 M2

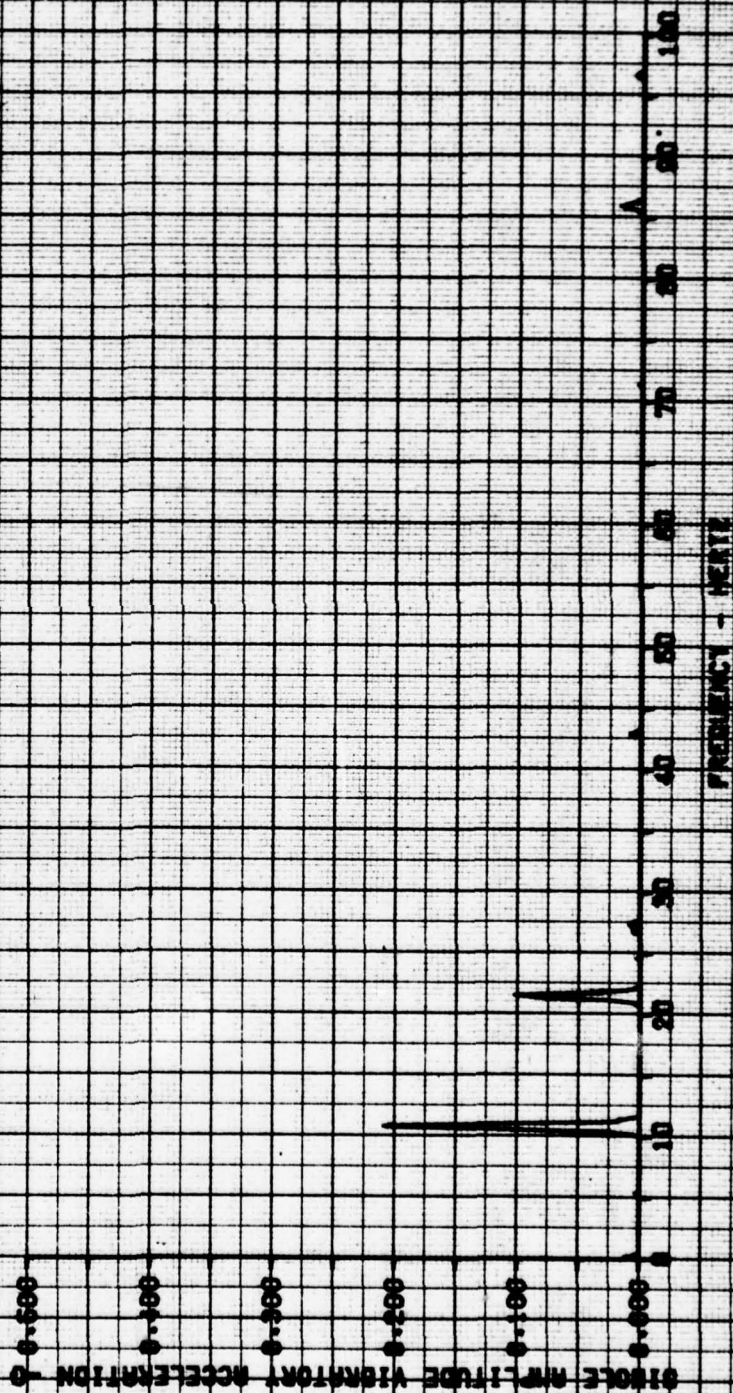


FIGURE 92

VIBRATION CHARACTERISTICS

LOCATION TRANSMISSION		MUN-14		1000 2/4	80-80000	FUNDAMENTAL FREQUENCY IS 2.10 10	
AXIS	VERTICAL	DENSITY	OUTSIDE AIR	ROTOR	TRIM ON (A)	FLIGHT	CONFIGURATION
HEIGHT	LONG	ALTITUDE	TEMPERATURE	SPEED	RECEIVED	CONDITION	
-LB	CG FB	-FT	-DEG C	-RPM	-K15		
8900	134.2 (FWD)	0.0 (H/D)	7.0	324.0	90.0	LEVEL	CALIB

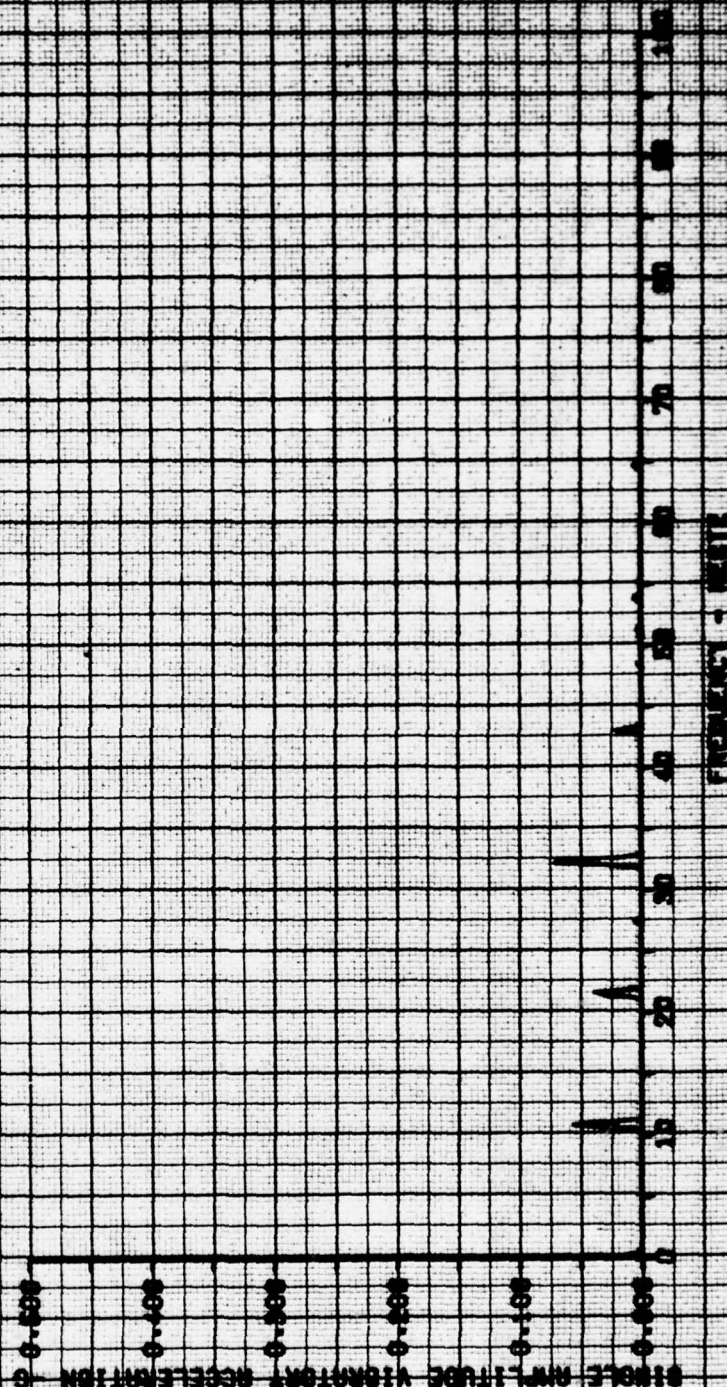


FIGURE 53

VIBRATION CHARACTERISTICS

LOCATION	COLLECTIVE CONTROL	MAN-IN	ISA S/N	SS-00853	FUNDAMENTAL FREQUENCY IS 3.40 HZ		
AXIS	VERTICAL	DENSITY	OUTSIDE AIR	ROTOR	TRAIN CALIB.	FLIGHT	CONFIGURATION
WEIGHT	LONG	ALTITUDE	TEMPERATURE	SPEED	AIR SPEED	CONDITION	
-LB	CS #3	-FT	-DEG C	-RPM	-KTS		
8000	134.2 (FWD)	0.0 (HND)	7.0	524.0	80.0	LEVEL	CLEAN

FLT 4
TRK 7
WCD 26
WRS 11
MIN 58
SEC 50
GRP 0

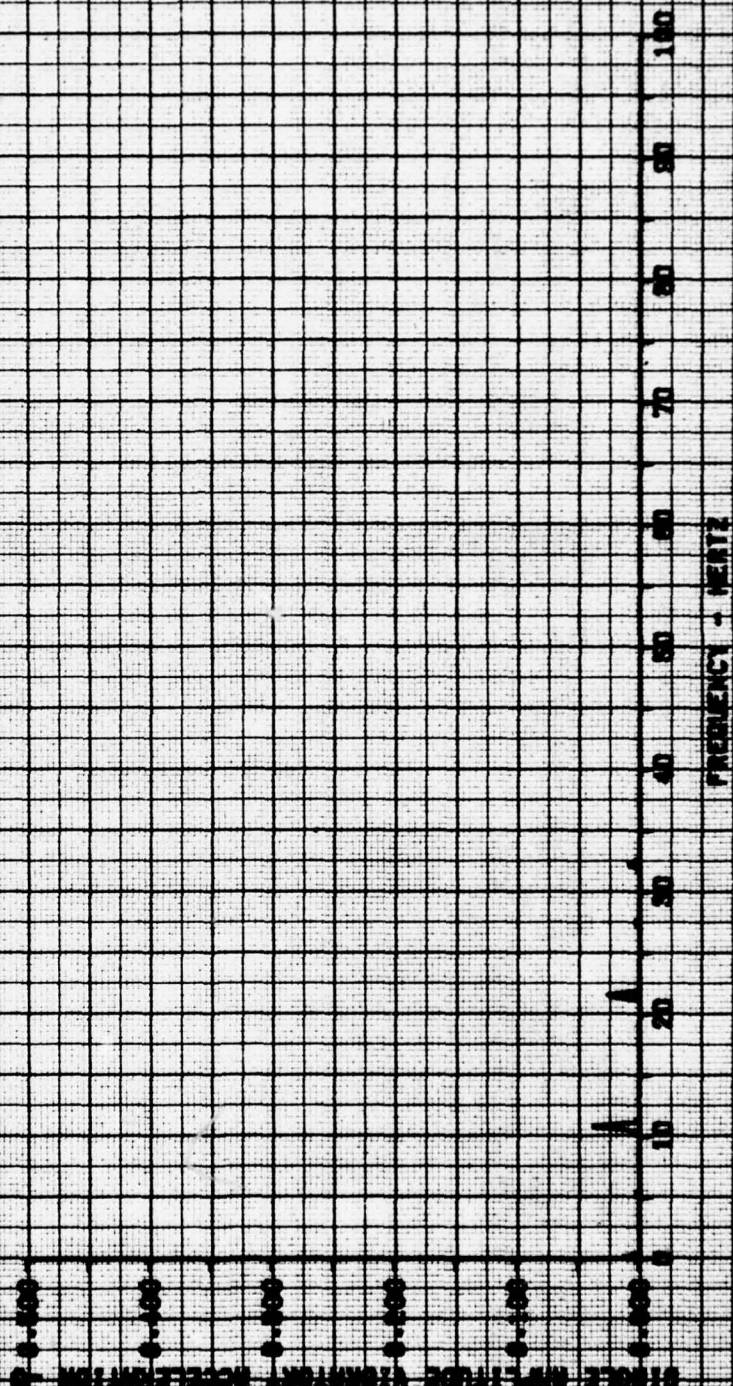
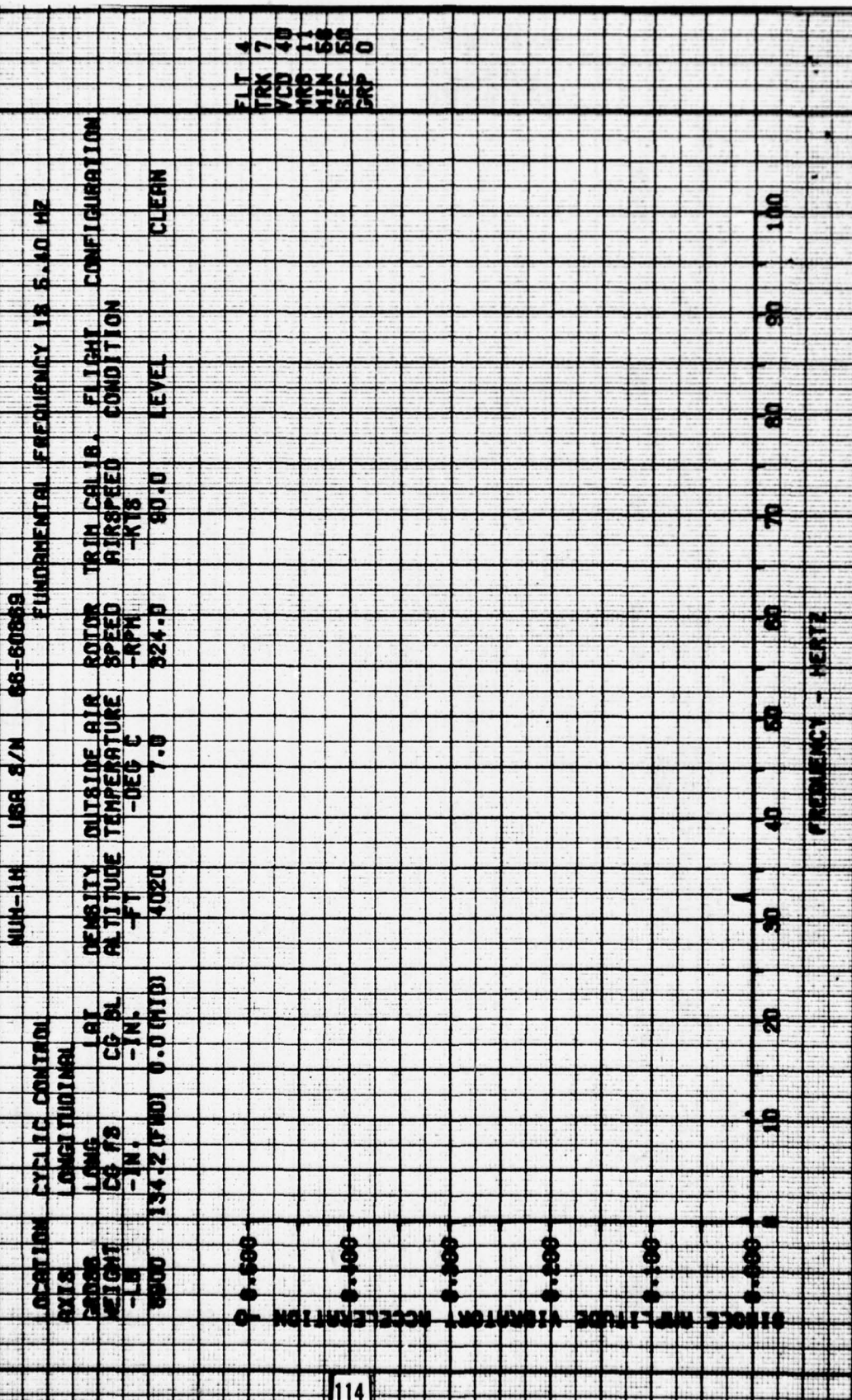
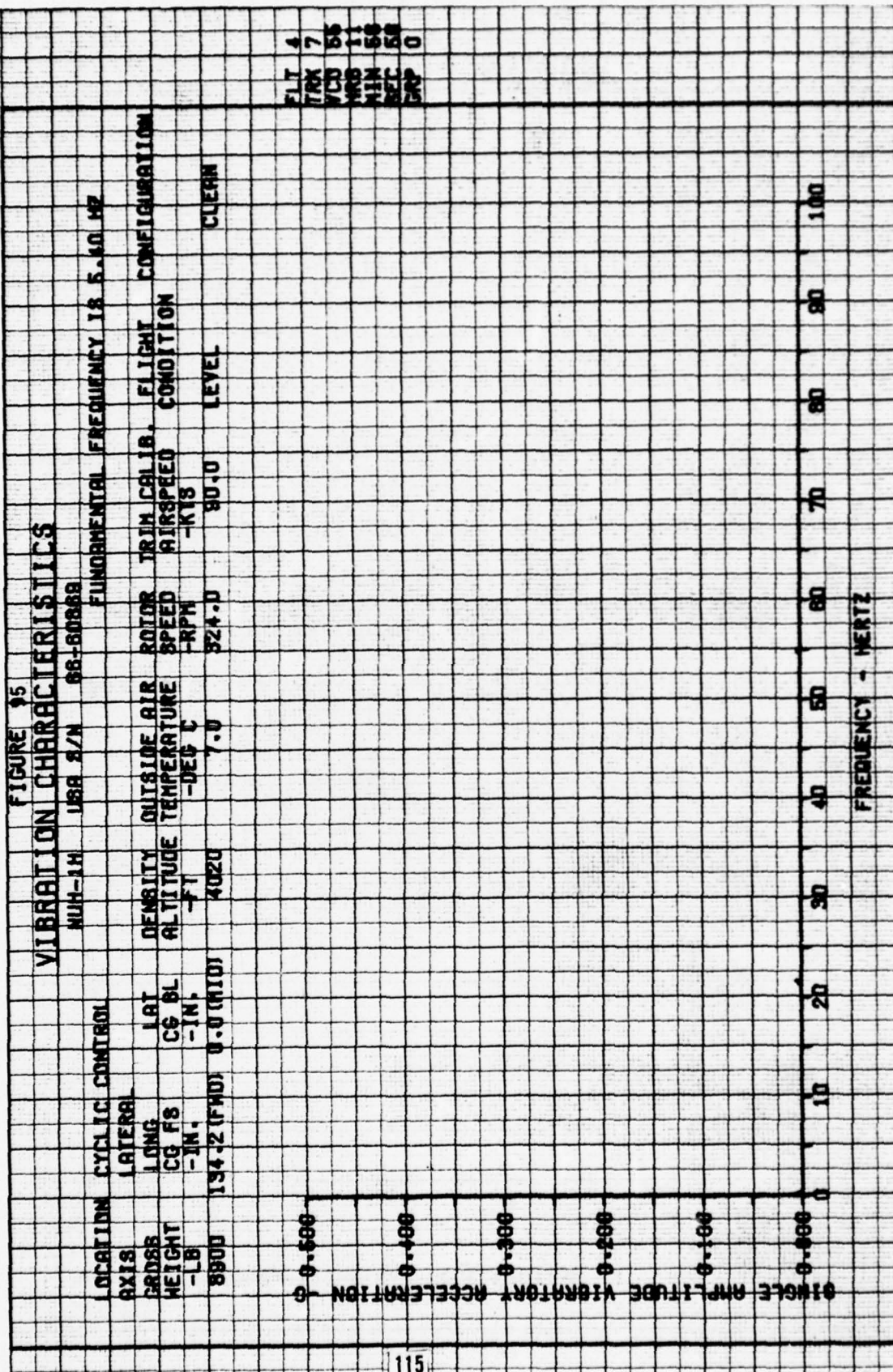


FIGURE 94

VIBRATION CHARACTERISTICS



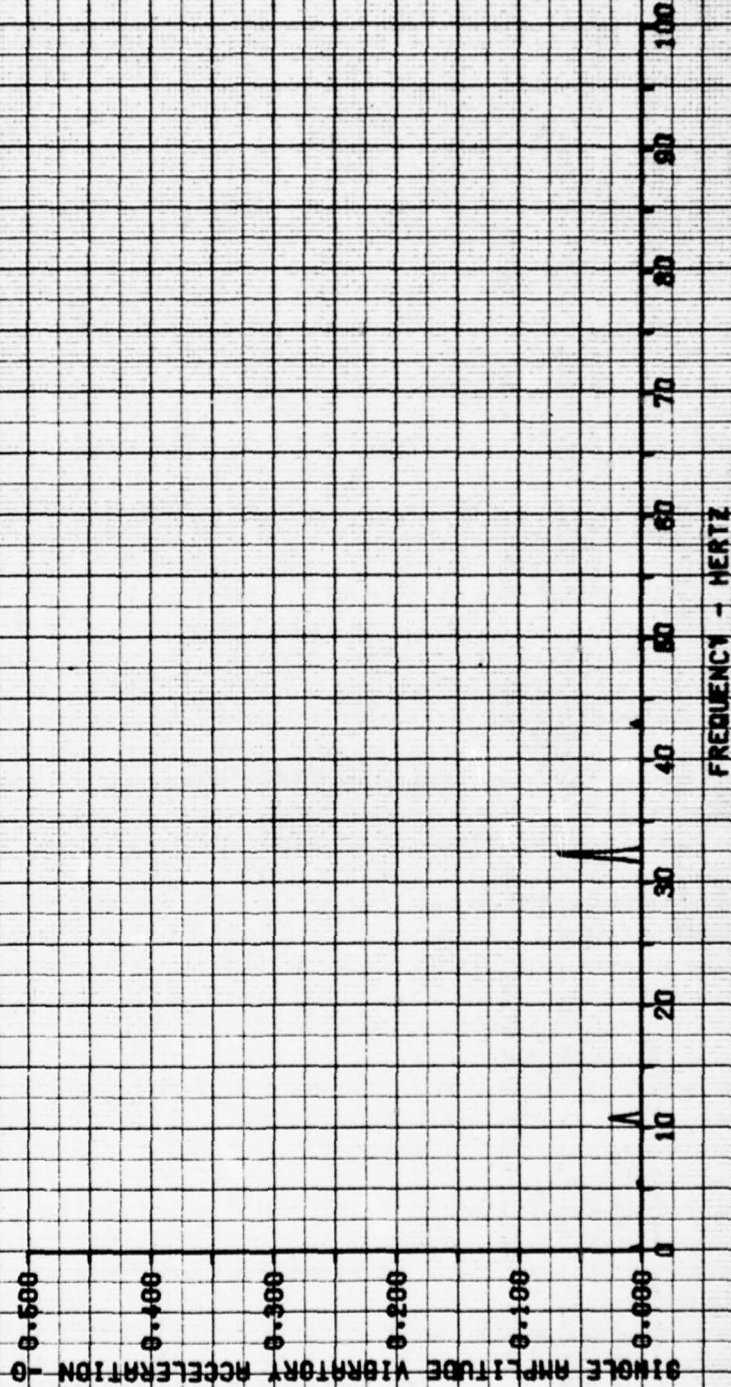


FLT 4
TRX 7
VCO 55
MRB 11
MIN 58
SEC 58
DOP 0

FIGURE 96

VIBRATION CHARACTERISTICS

LOCATION FORWARD PALLET FLOOR MOUNT
 AXIS VERTICAL
 GROSS WEIGHT 8900
 LONG CG FS 134.2 (FWD)
 LAT CG BL 0.0 (HD)
 DENSITY 4020
 ALTITUDE -FT 7.0
 OUTSIDE AIR TEMPERATURE -DEG C 324.0
 ROTOR SPEED -RPM 80.0
 TRIM CALIB. -KTS
 FLIGHT CONDITION LEVEL
 CONFIGURATION CLEAN



FLT 4
 FRX 7
 YCS 78
 MRS 11
 MIN 58
 SEC 58
 DRP 0

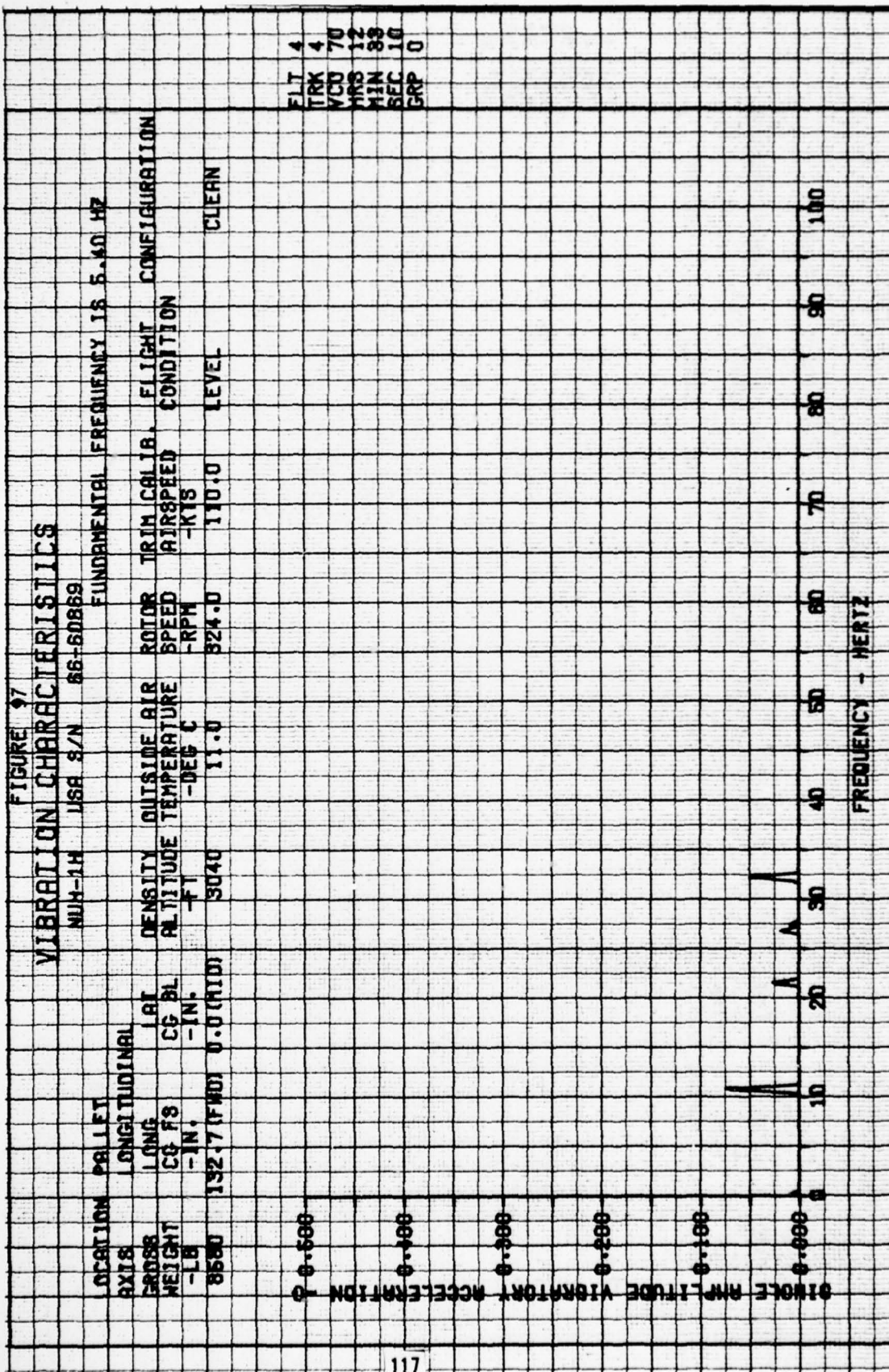


FIGURE 98

VIBRATION CHARACTERISTICS

NUH-1H USA 8/N 66-50869

FUNDAMENTAL FREQUENCY IS 5.40 HZ

LOCATION PALLET

AXIS LATERAL

ORDER LONG

WEIGHT CG F'S

-IN. -IN.

6580 132.7 (FWD) 0.0 (MID)

LAT

CG BL

-IN.

DENSITY

ALTITUDE

-FT

5040

OUTSIDE AIR

TEMPERATURE

-DEG C

11.0

ROTOR

SPEED

-RPM

824.0

TRIM CALIB.

FLIGHT

CONDITION

110.0

AIR SPEED

LEVEL

CLEAN

CONFIGURATION

0 0.500

0.100

0.200

0.300

0.400

0.500

0.600

0.700

0.800

0.900

1.000

1.100

1.200

1.300

1.400

1.500

1.600

1.700

1.800

1.900

2.000

2.100

2.200

2.300

2.400

2.500

2.600

2.700

2.800

2.900

3.000

3.100

3.200

3.300

3.400

FLT 4

TRK 4

VCO 85

MRS 12

MIN 38

SEC 10

GRP 0

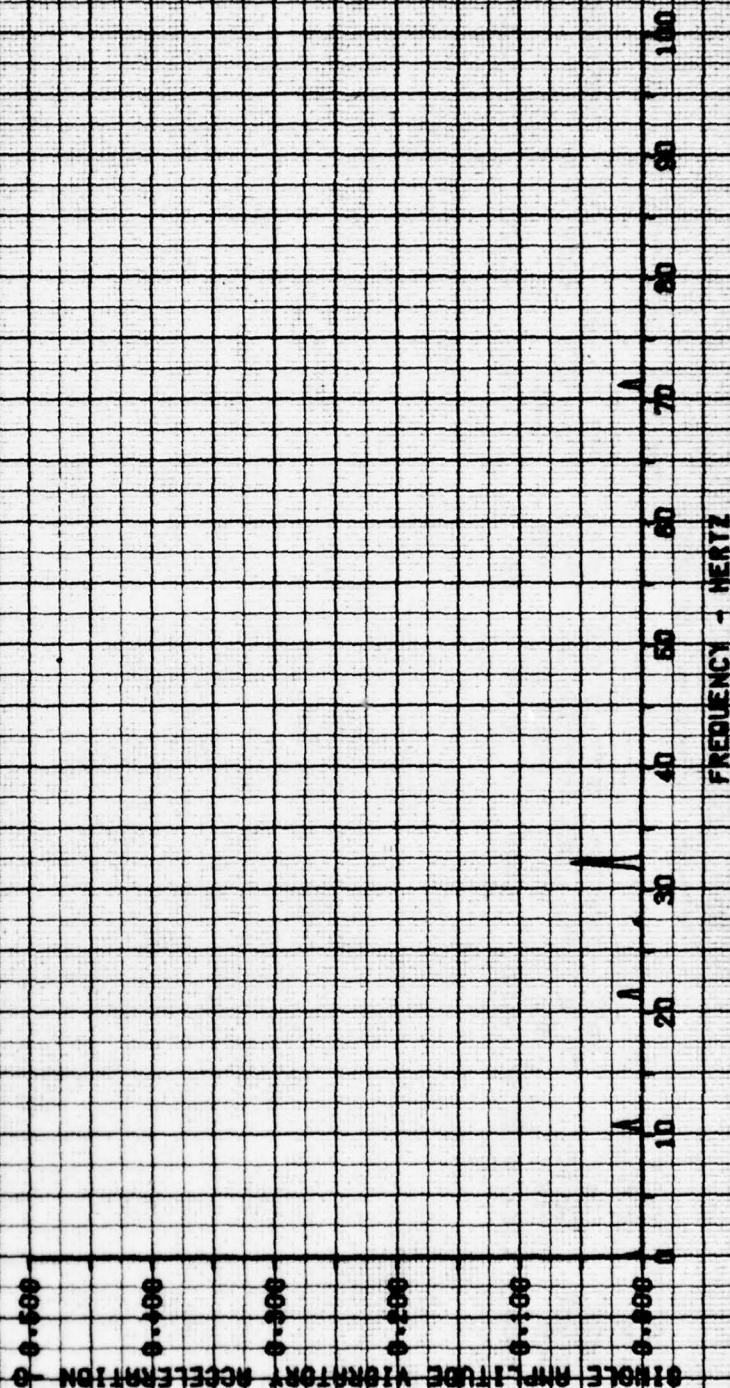
FREQUENCY - HERTZ

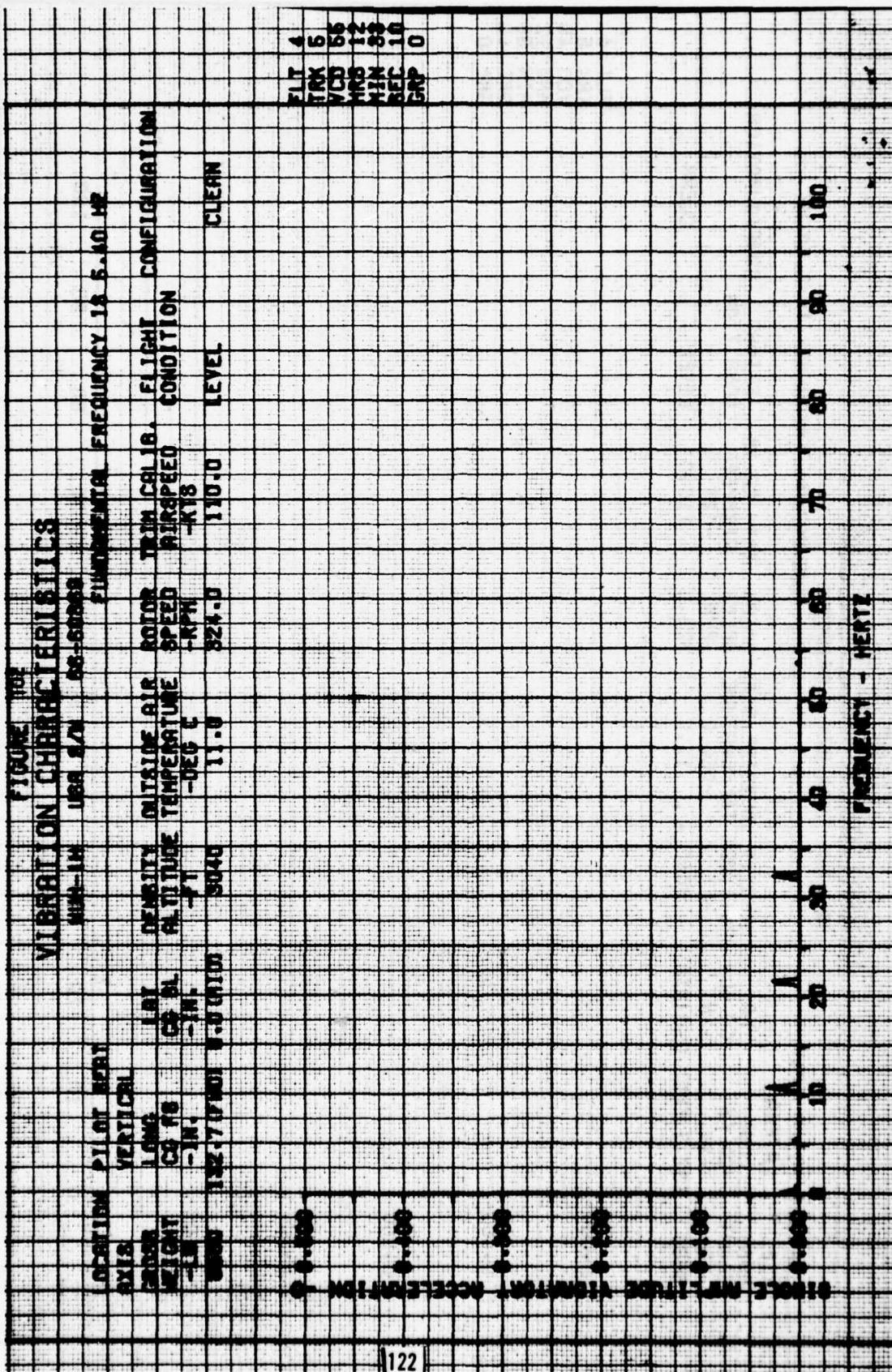
FIGURE 100

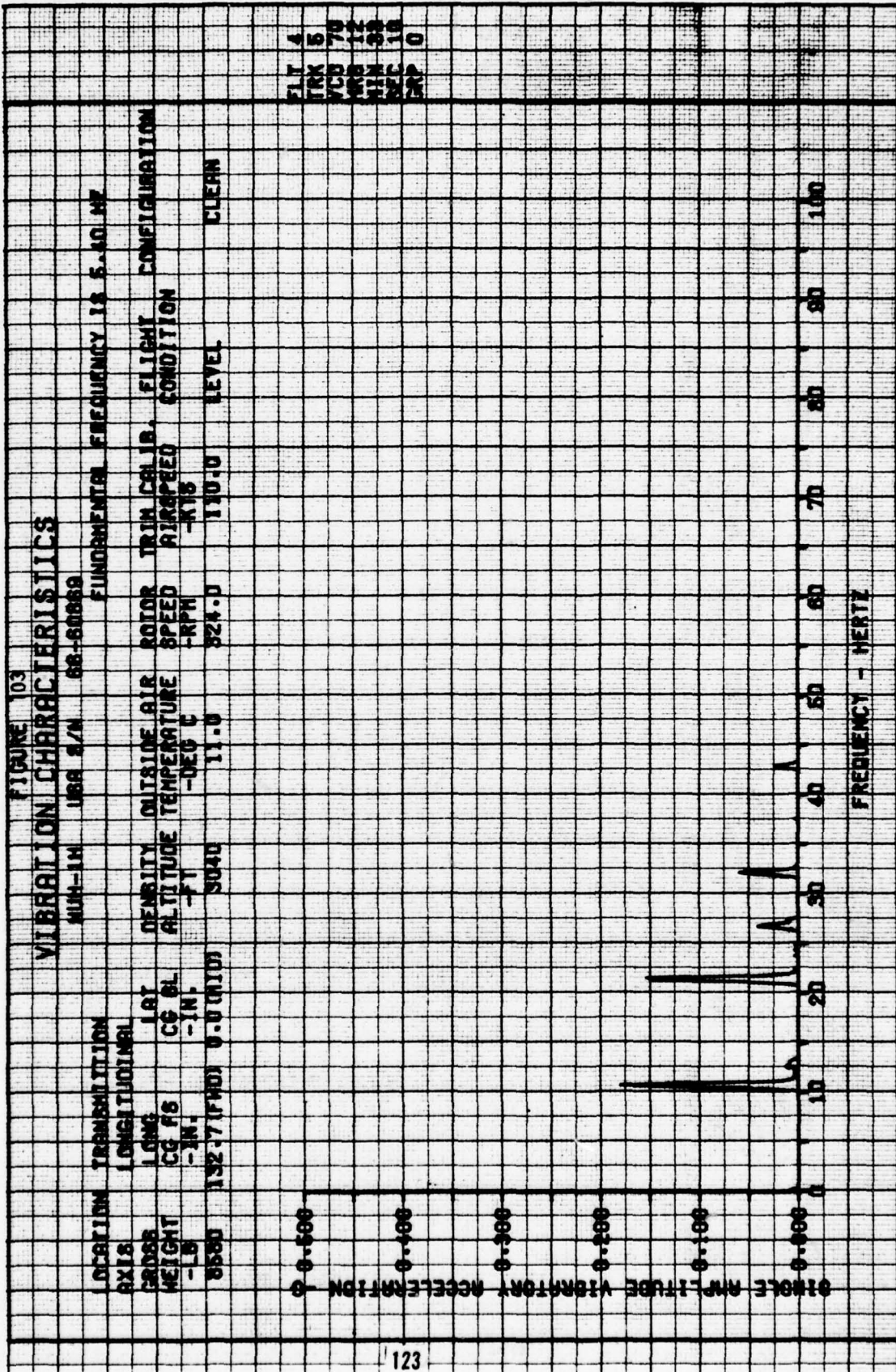
VIBRATION CHARACTERISTICS

LOCATION PILOT SEAT
 AXIS LONGITUDINAL
 GROSS LONG
 WEIGHT CG F8
 -LB -IN.
 8580 132.7 (FWD) 8.0 (AID)
 LAT CG BL
 -IN.
 DENSITY OUTSIDE AIR ROTOR TRIM CALIB. FLIGHT CONFIGURATION
 ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION
 -FT -DEG C -RPH -KTS
 3040 11.0 324.0 110.0 LEVEL CLEAN
 FUNDAMENTAL FREQUENCY IS 5-10 HZ

FLT 4
 TAX 6
 VCS 24
 WBS 12
 MIN 30
 SEC 18
 ZPD 0







FLY 4
TRK 5
VCS 70
WBS 12
MIN 33
SEC 18
SRP 0

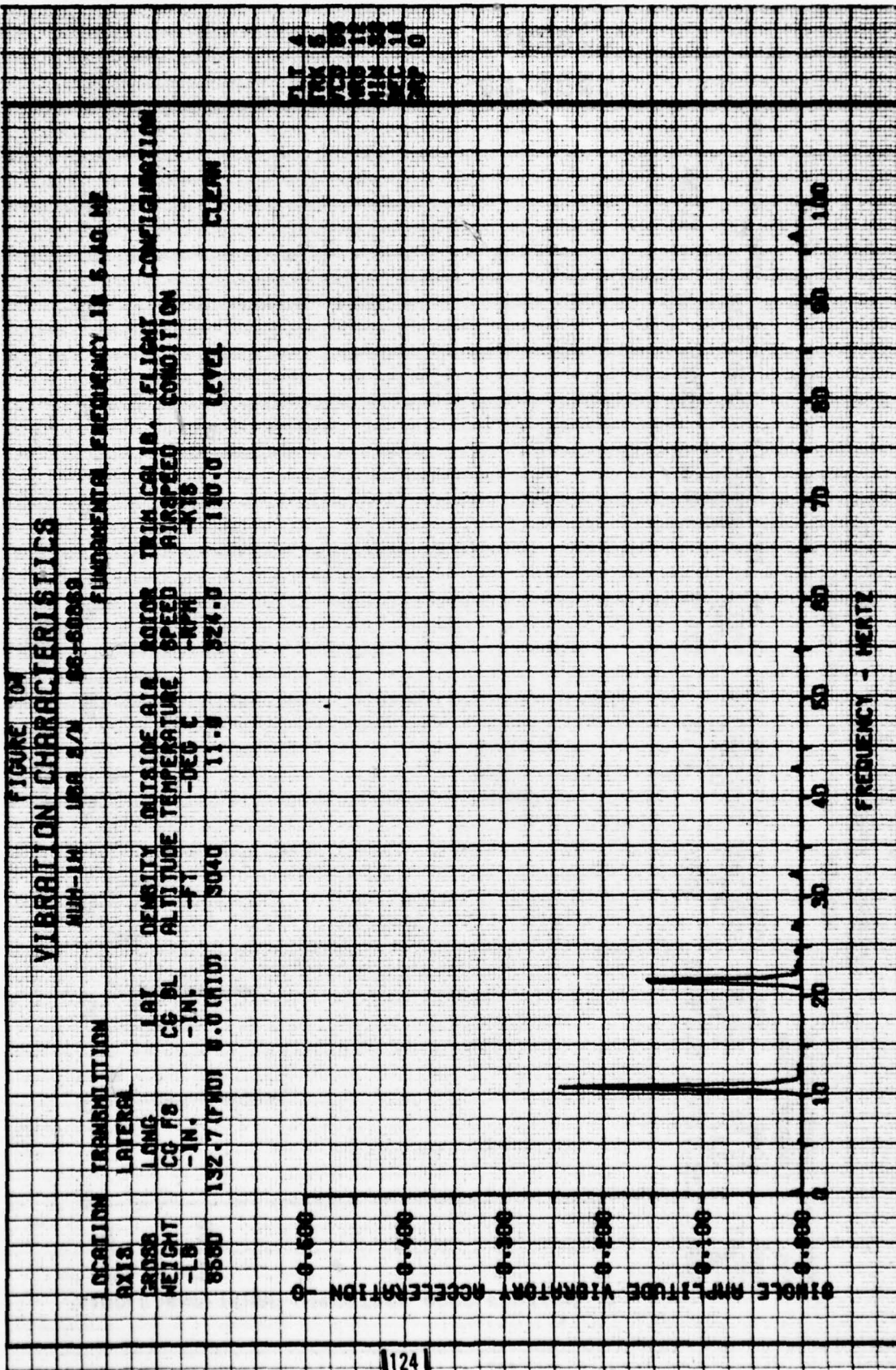
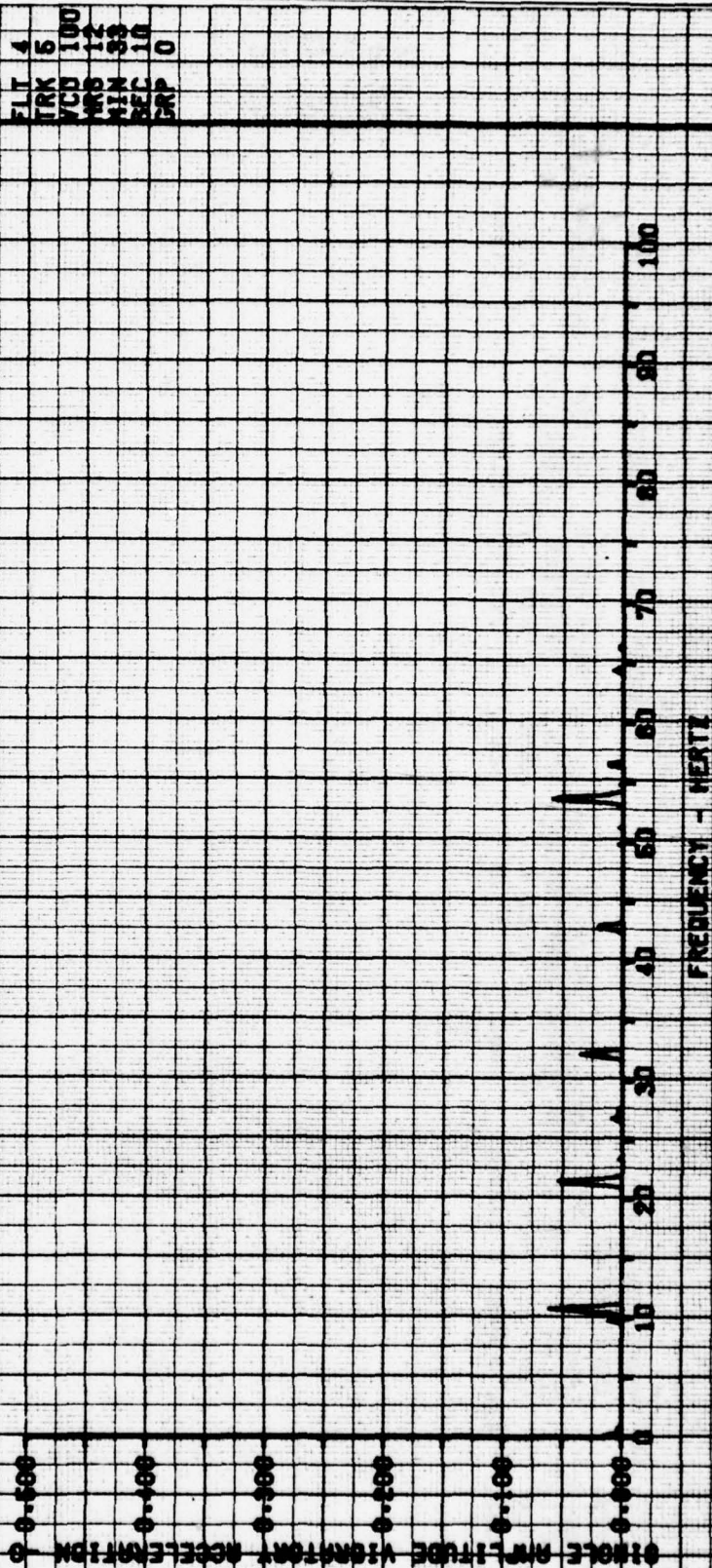


FIGURE 105
VIBRATION CHARACTERISTICS

LOCATION	TRANSMISSION	NUM-1M	UGS S/N	SS-60000	FUNDAMENTAL FREQUENCY	IS 5.40 MHZ
AXIS	VERTICAL					
30000	LONG					
WEIGHT	CG FB					
-LB	-IN.					
	LAT					
	CG BL					
	-IN.					
	DENSITY					
	ALTITUDE					
	-FT					
	OUTSIDE AIR					
	TEMPERATURE					
	-DEG C					
	SPEED					
	-RPH					
	TRIM CALIB.					
	AIRSPEED					
	-KTS					
	FLIGHT					
	CONDITION					
	LEVEL					
8500	132.7 (FMS)	0.0 (M10)	11.0	324.0	110.0	CLEAN



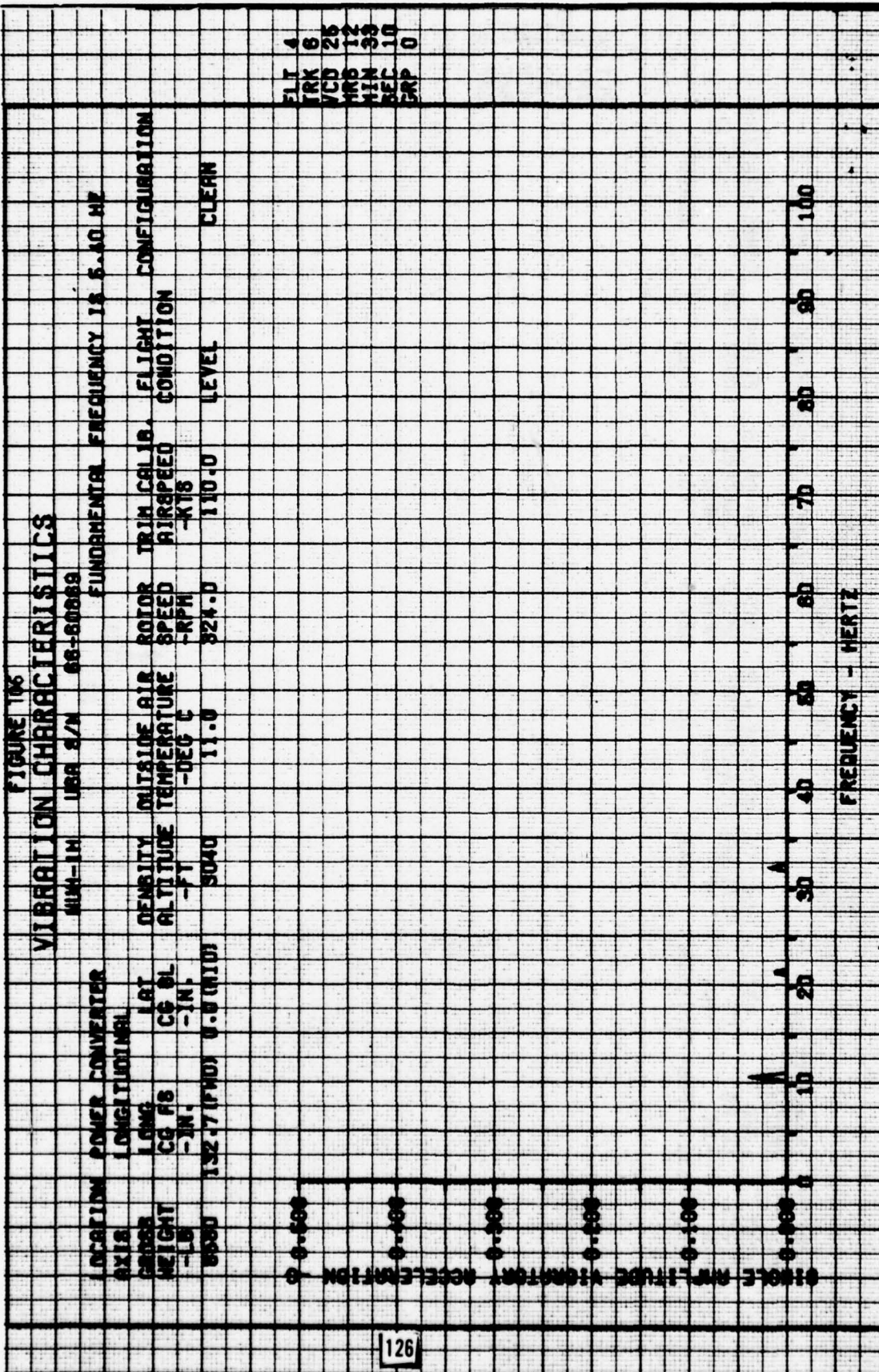


FIGURE 107

VIBRATION CHARACTERISTICS

LOCATION	POWER CONVERTER	NUM-1H	ISA S/N	66-80889	FUNDAMENTAL FREQUENCY IS 5.10 HZ
AXIS	LATERAL				
GROSS WEIGHT	LONG	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.
-LB	CG F8	ALTITUDE	TEMPERATURE	SPEED	FLIGHT CONFIGURATION
	-IN.	-FT	-DEG C	-RPH	
8580	132.7 (FWD)	0.0 (MID)	11.0	324.0	110.0
					LEVEL
					CLEAN

FLT 4
TRK 6
VCD 40
NRB 12
MIN 33
SEC 10
GRP 0

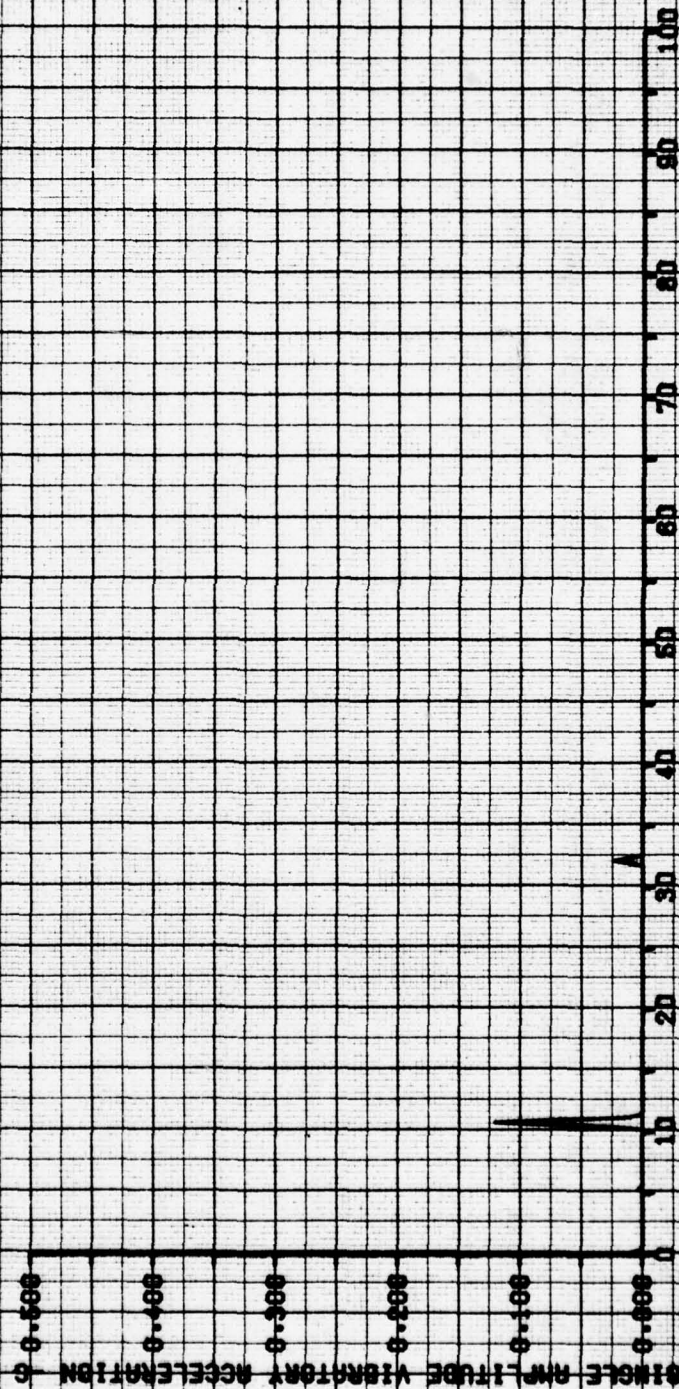
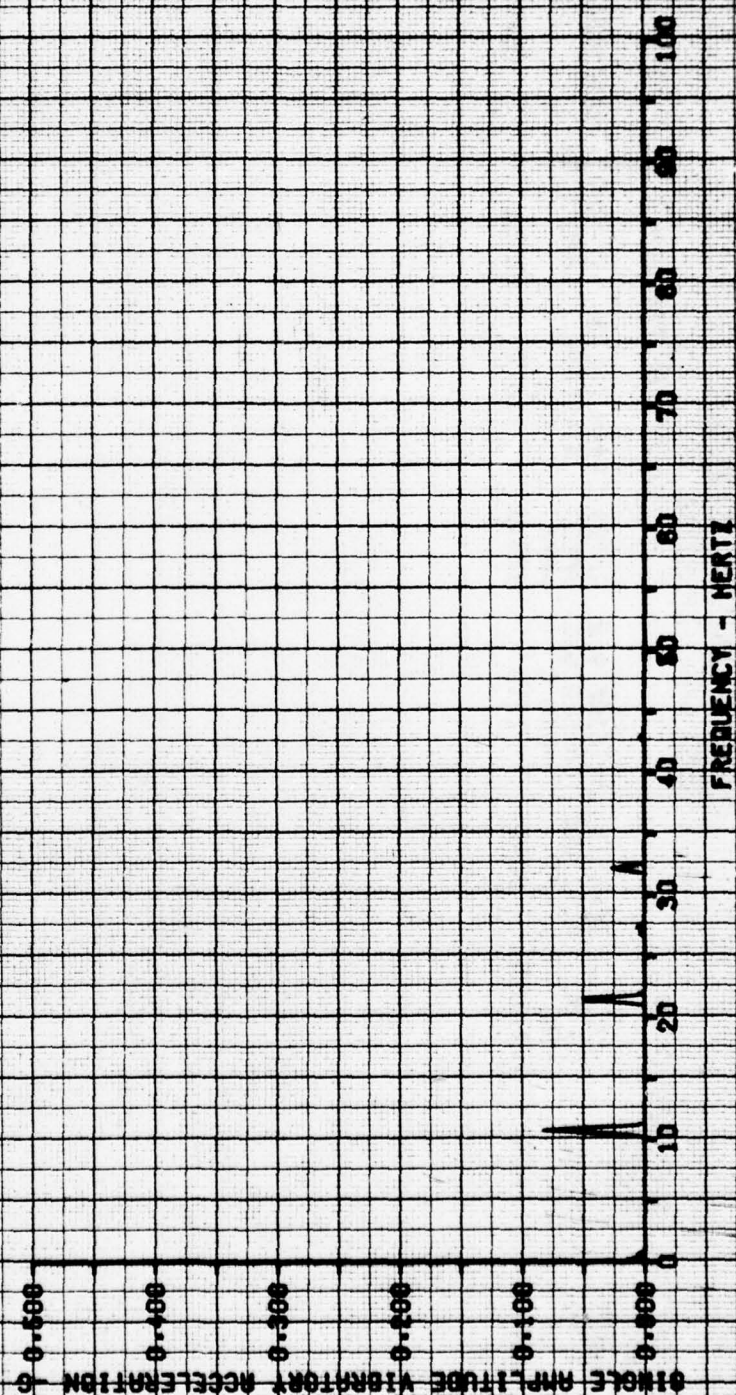


FIGURE 108

VIBRATION CHARACTERISTICS

LOCATION	POWER CONVERTER	WIND-111	UGA S/N	66-60869	FUNDAMENTAL FREQUENCY	18.5-10. HZ
AXIS	VERTICAL	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.	FLIGHT CONFIGURATION
GROSS	LONG	ALTITUDE	TEMPERATURE	SPEED	AIR SPEED	CONDITION
HEIGHT	CG FB	-IN.	-DEG C	-RPH	-KTS	
-LB	132.7 (FWD)	0.0 (MID)	11.0	324.0	110.0	CLEAN

FLY 4
 FIX 6
 VCS 66
 WDS 112
 HIN 30
 SEC 10
 DAY 0



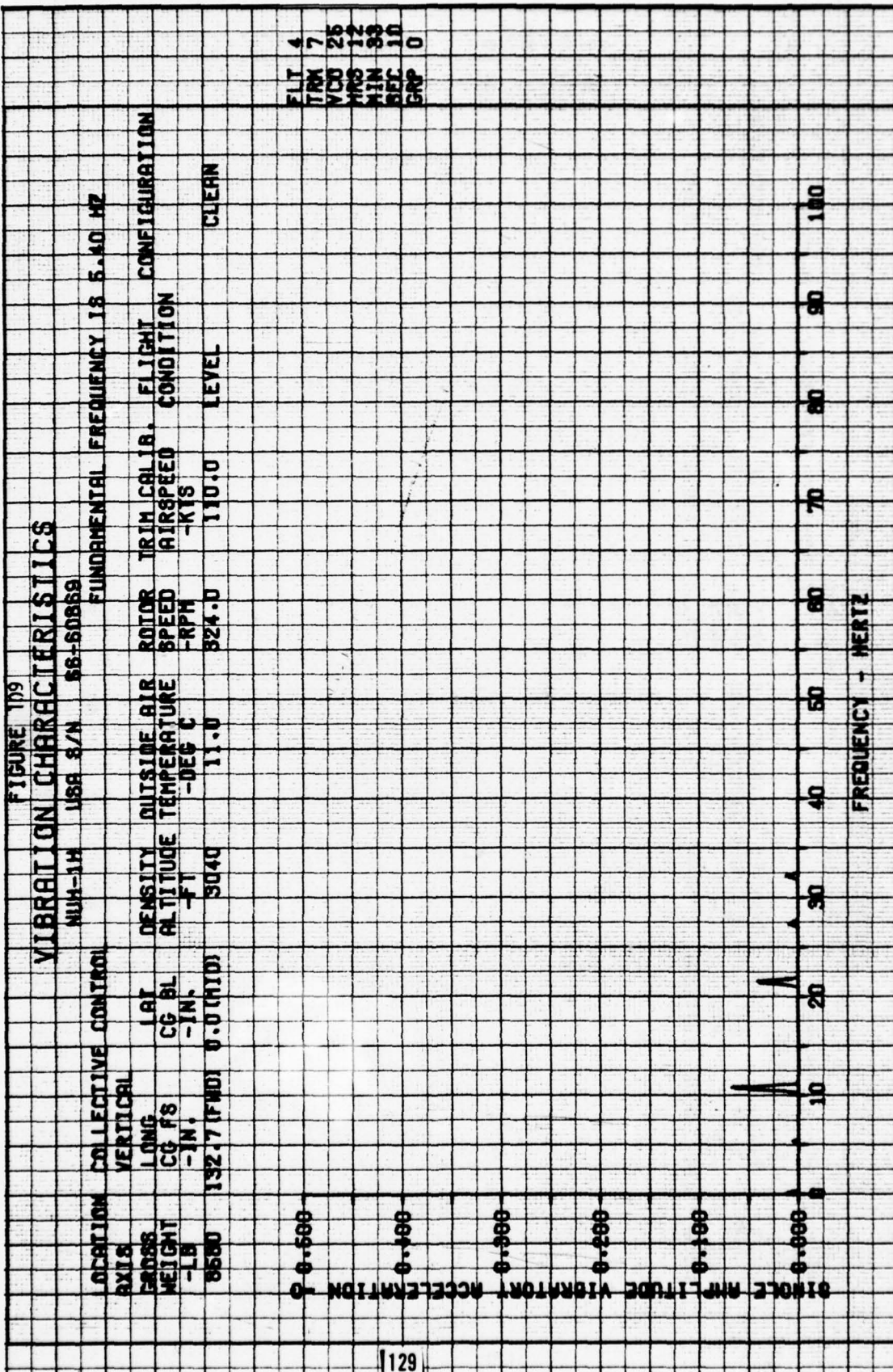


FIGURE NO

VIBRATION CHARACTERISTICS

MUH-1H USA S/N 66-60868

FUNDAMENTAL FREQUENCY 18 5.40 HZ

LOCATION CYCLIC CONTROL

AXIS LONGITUDINAL

LONG

CG F'S

-IN.

132.7 (FWD)

0.0 (NID)

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0.0 (NID)

DENSITY OUTSIDE AIR

ROTOR TRIM CALIB. FLIGHT CONFIGURATION

SPEED AIRSPEED CONDITION

-RPM

524.0

110.0

LEVEL

CLEAN

3040

11.0

524.0

110.0

LEVEL

CLEAN

3040

11.0

524.0

110.0

LEVEL

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LEVEL

CLEAN

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524.0

110.0

LEVEL

CLEAN

3040

11.0

FLT 4
TRK 7
VCO 40
MNS 12
MIN 33
SEC 10
GRP 0

SINGLE AMPLITUDE VIBRATION ACCELERATION

FREQUENCY - HERTZ

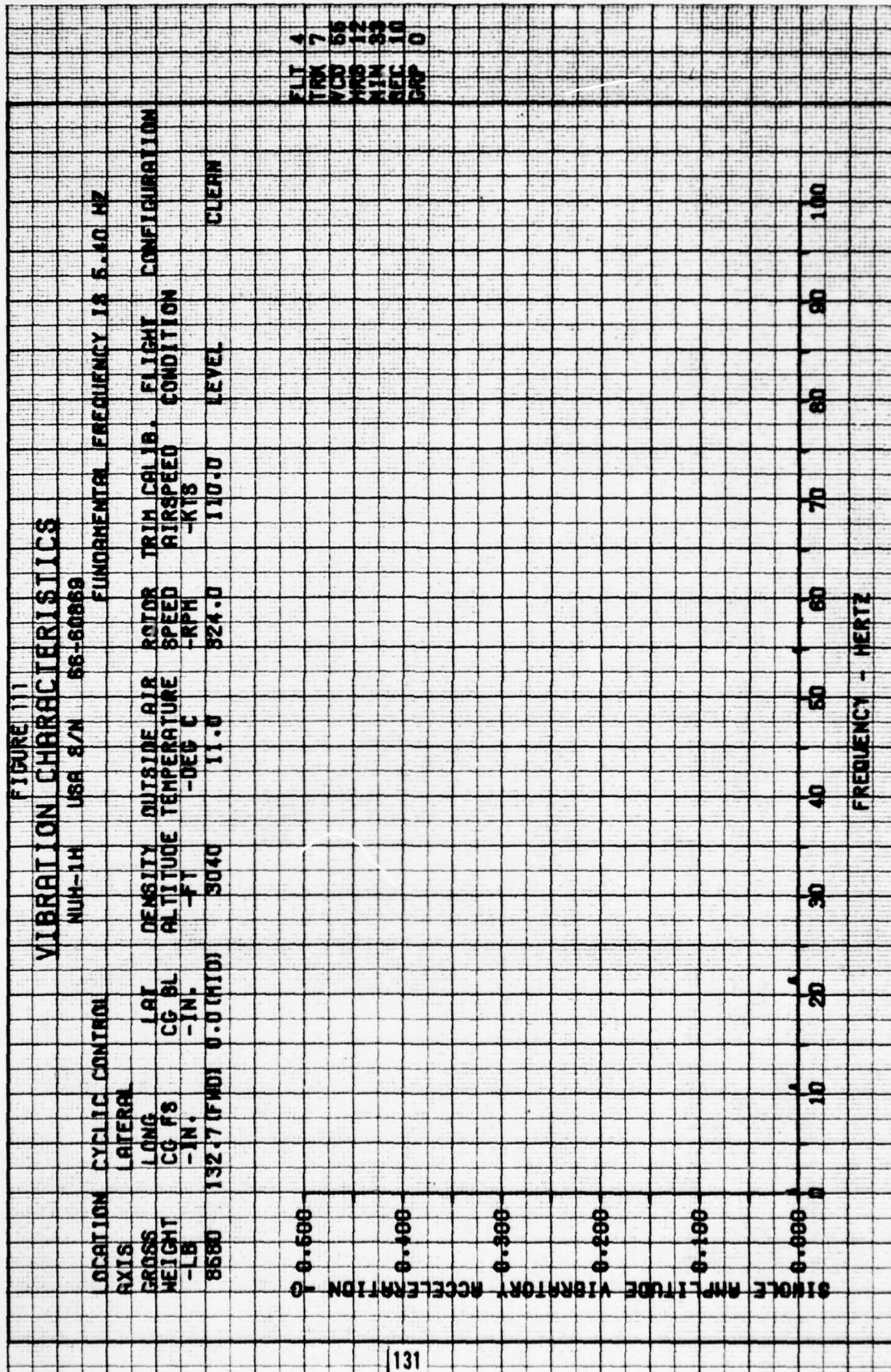


FIGURE 112

VIBRATION CHARACTERISTICS

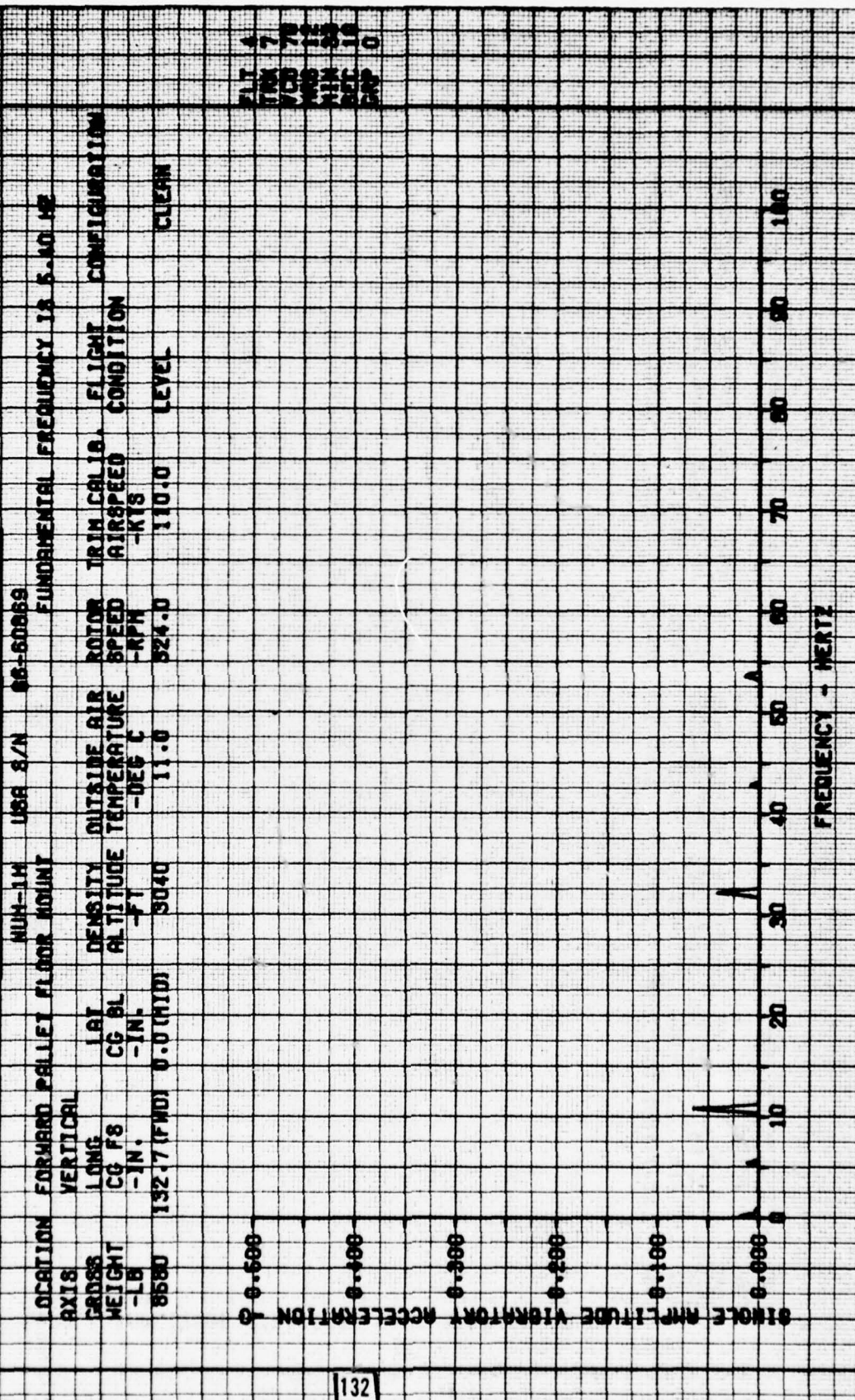
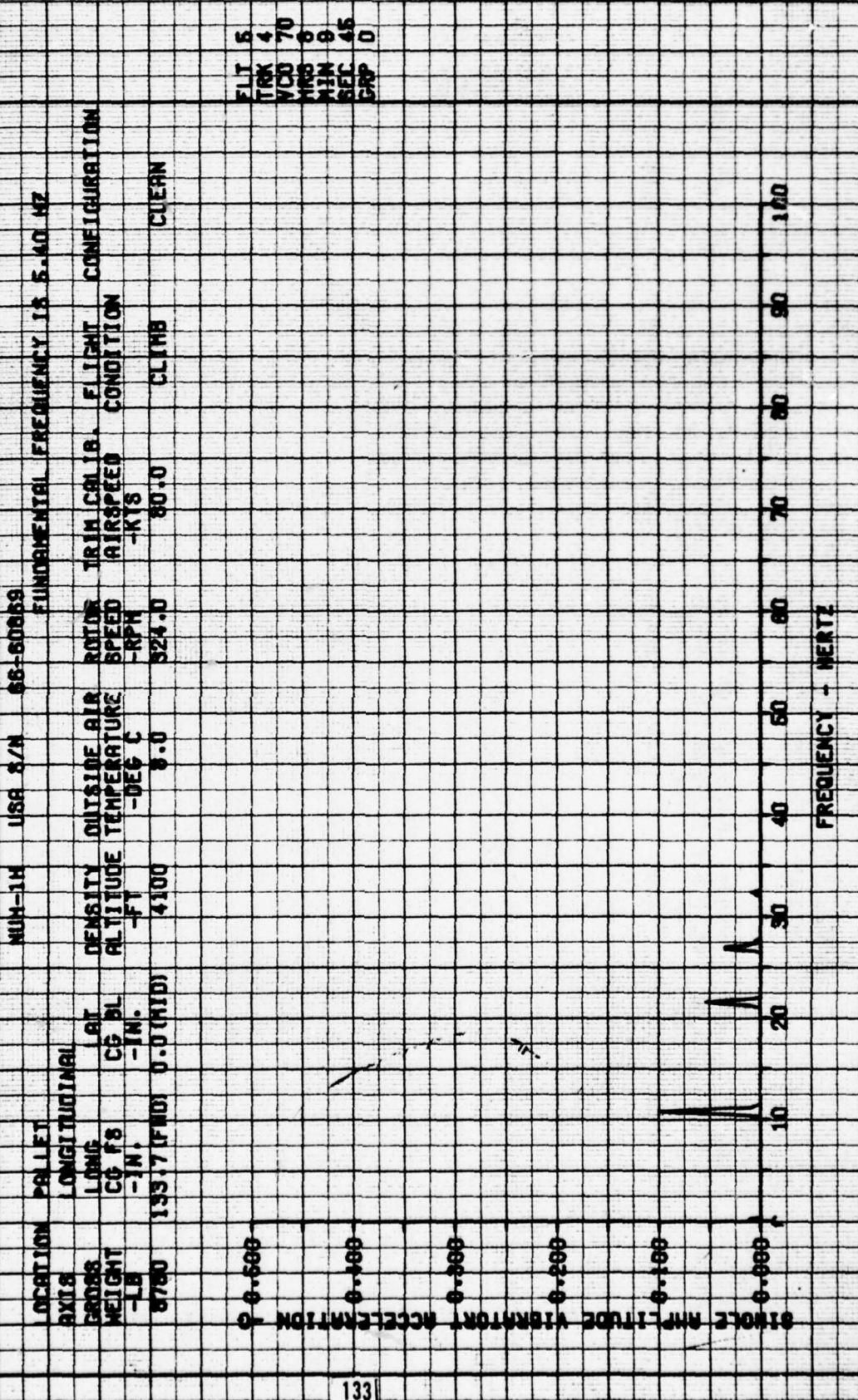


FIGURE 113

VIBRATION CHARACTERISTICS



FLT 5
TRK 4
VCO 70
HNS 8
MIN 9
SEC 45
GRP 0

FIGURE 14
VIBRATION CHARACTERISTICS

MIH-1H LOR S/N 88-50838
FURNITURE FREQUENCY 18 5.40 MZ

[illegible]

ELT	5
TRAX	4
VCD	86
NRG	8
MIN	8
BEC	45
GRP	0

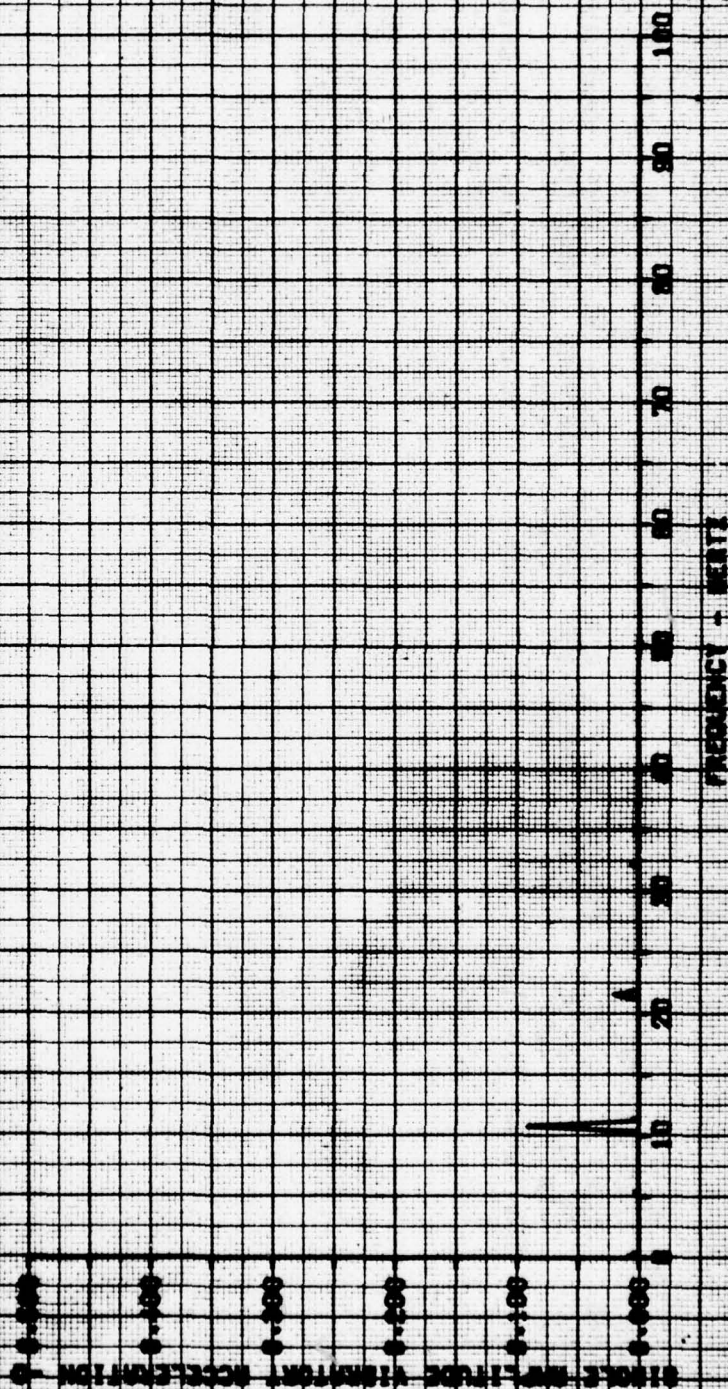


FIGURE 13

VIBRATION CHARACTERISTICS

LOCATION PALLET
 AXIS VERTICAL
 GROSS WEIGHT 8750
 CG H 133.7 (FWD)
 CG L 0.0 (SID)
 DENSITY 4100
 ALTITUDE -FT 4100
 OUTSIDE AIR TEMPERATURE -DEG C 0.0
 ROTOR SPEED -RPM 524.0
 TRIM CALIB. FLIGHT CONFIGURATION
 AIRSPEED -KTS 80.0
 CLIMB
 CLEAN
 FUNDAMENTAL FREQUENCY IS 5.40 HZ

FLT 5
 TAX 5
 VCS 55
 WBS 8
 MIN 9
 SEC 45
 CRP 0

SINGLE AMPLITUDE VIBRATION ACCELERATION
 0.000
 0.100
 0.200
 0.300
 0.400
 0.500

FREQUENCY - HERTZ

0 10 20 30 40 50 60 70 80 90 100

FIGURE 116

VIBRATION CHARACTERISTICS

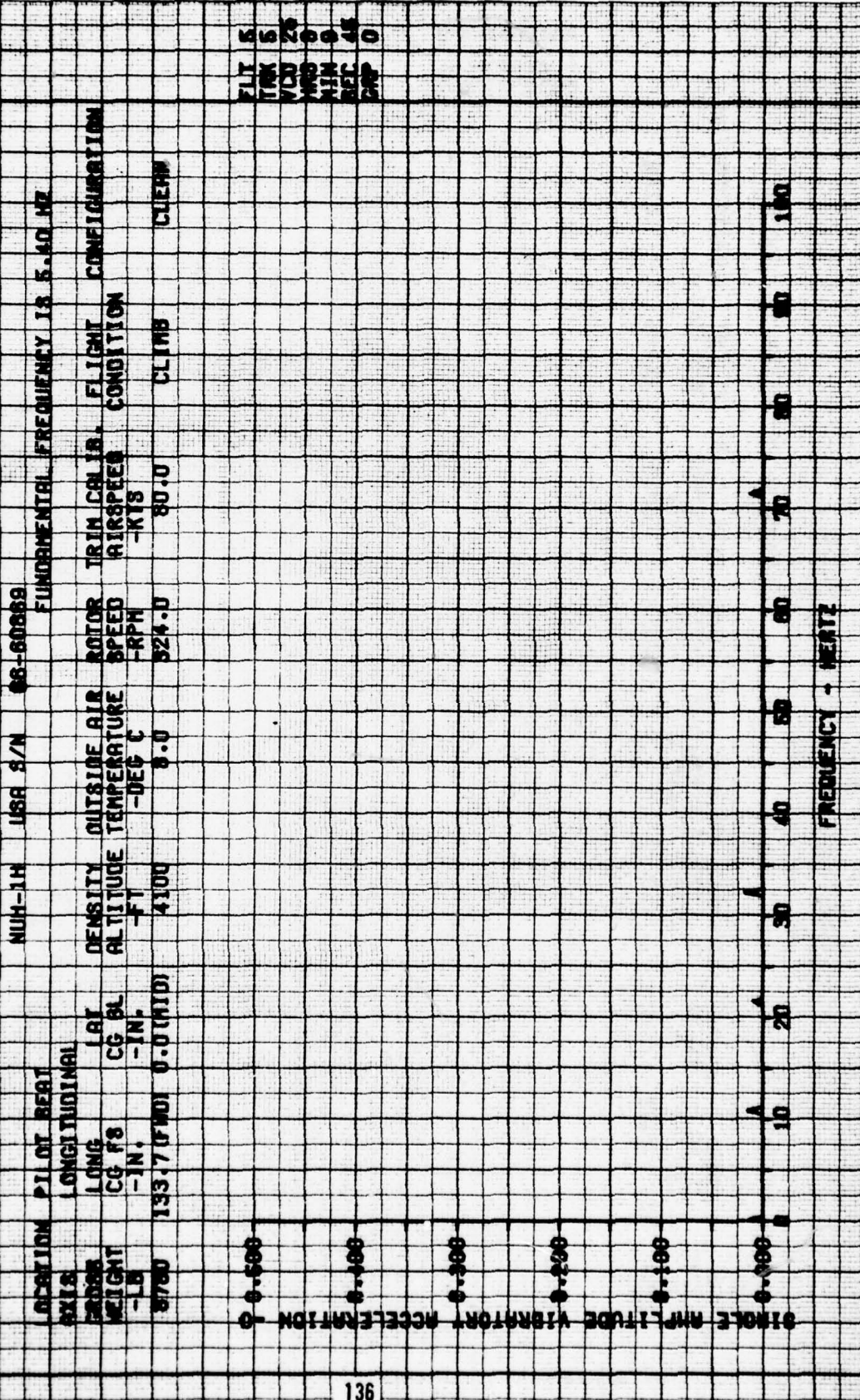


FIGURE 117

VIBRATION CHARACTERISTICS

MUH-1H USA S/N 88-50859 FUNDAMENTAL FREQUENCY IS 5.40 HZ

LOCATION PILOT SEAT
 EXTRA LATERAL
 LONG
 CG F8
 -IN.
 133.7 (FWD) 0.0 (MID)

DENSITY OUTSIDE AIR ROTOR TRIM CALIB. FLIGHT CONFIGURATION
 ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION
 -FT -DEG C -RPM -KTS
 4100 8.0 324.0 80.0 CLIMB CLEAN

FLT 8
 TRN 5
 VCU 40
 HRS 8
 MIN 8
 SEC 45
 CRP 0

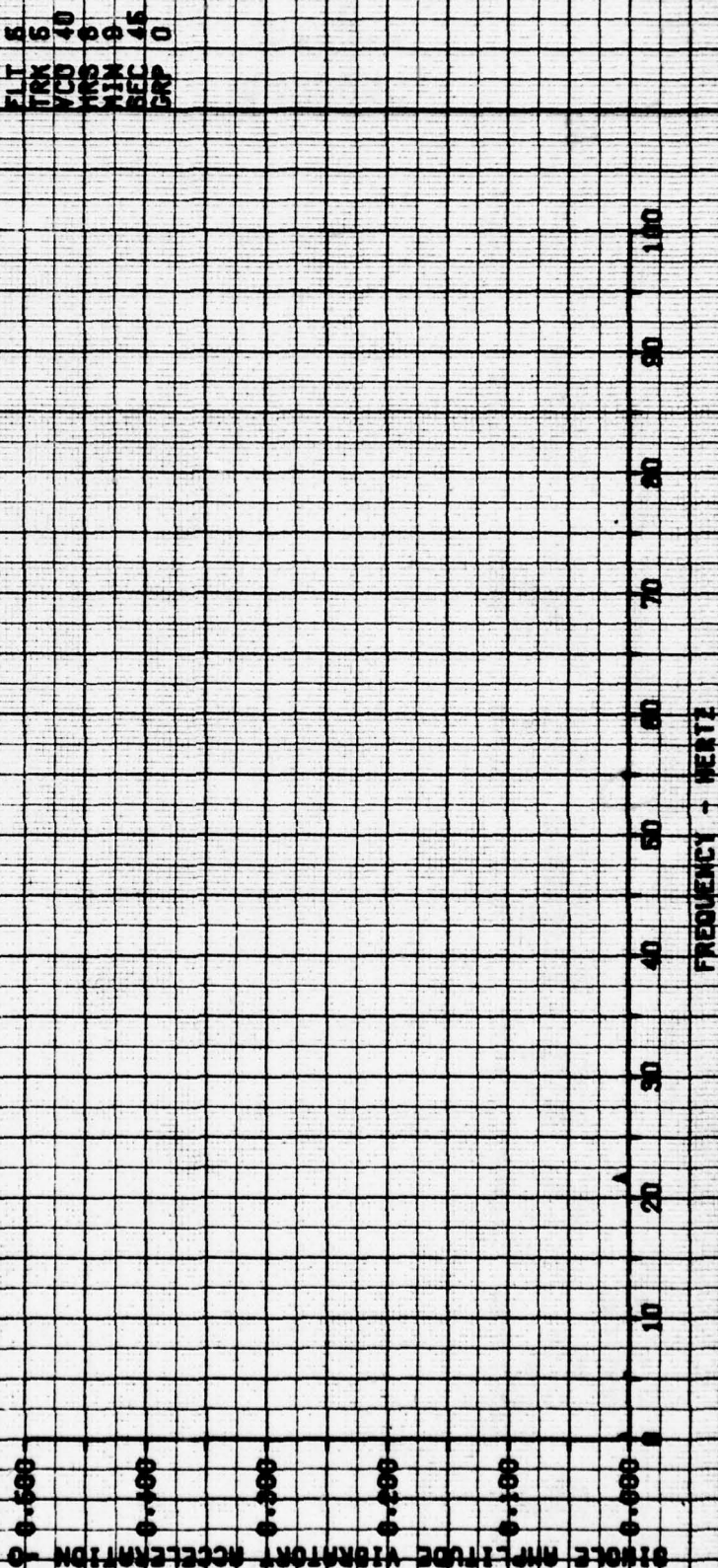


FIGURE 11B

VIBRATION CHARACTERISTICS

MM-1H 18A 2/N 86-50253

FUNDAMENTAL FREQUENCY IS 5.40 HZ

LOCATION PILOT SEAT

AXIS VERTICAL

POSITIVE

WEIGHT CG #8

-IN.

133.7 (FWD)

0.0 (NID)

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WIND

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FIGURE 119

VIBRATION CHARACTERISTICS

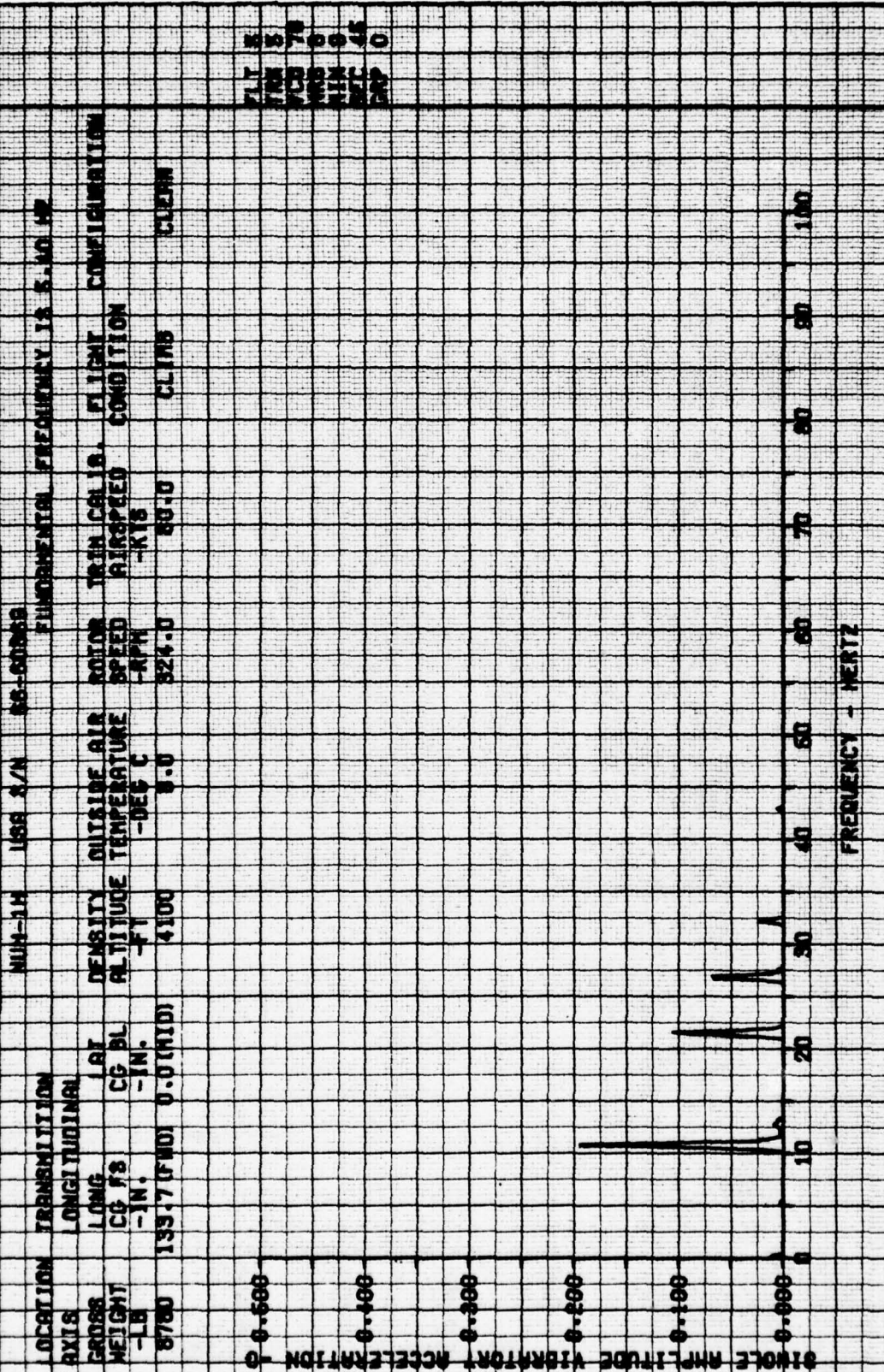
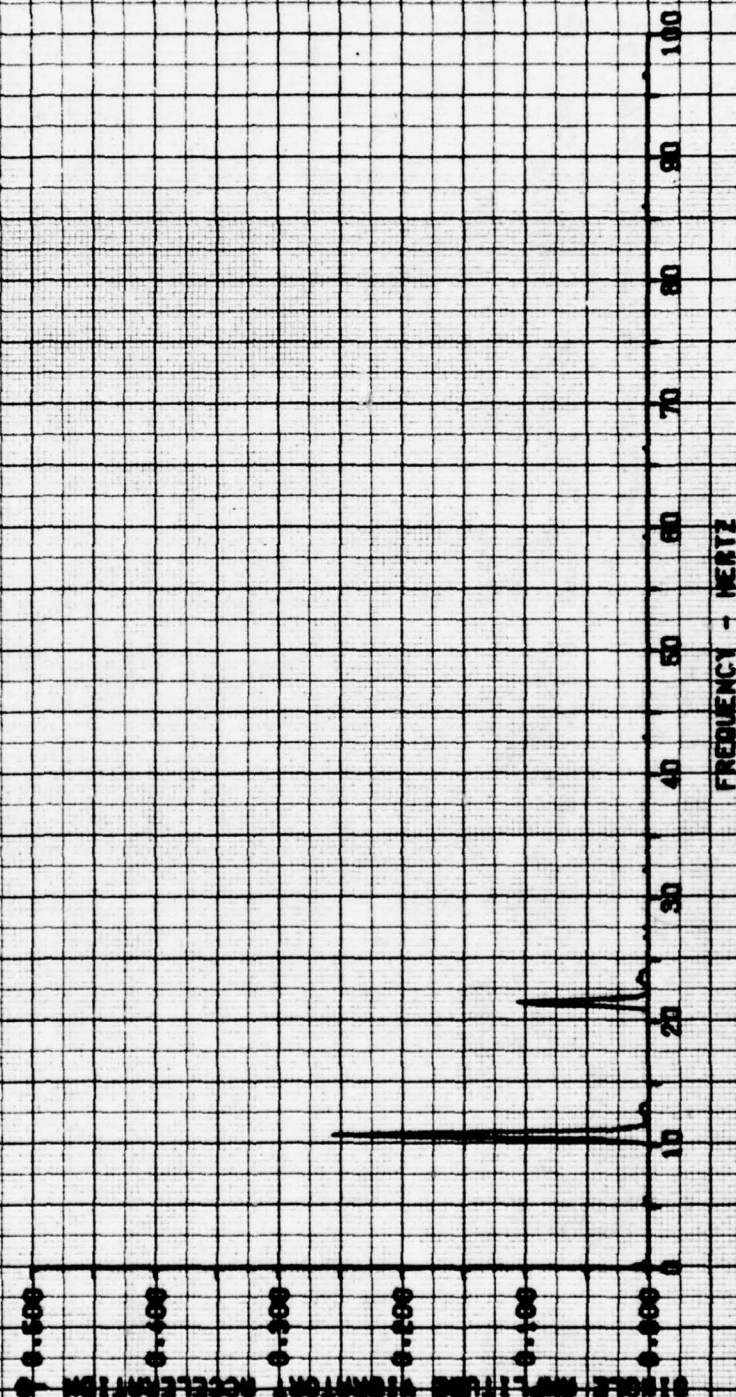


FIGURE 120

VIBRATION CHARACTERISTICS

LOCATION TRANSMISSION		NUM-IN		ISA S/N		66-60868		FUNDAMENTAL FREQUENCY		13.5.10 MZ	
AXIS	LATERAL	DENSITY	OUTSIDE AIR	ROTOR	TRIN CALIB.	FLIGHT	CONFIGURATION				
WEIGHT	LONG	ALTITUDE	TEMPERATURE	SPEED	AIR SPEED	CONDITION					
-LB	-IN.	-FT	-DEG C	-RPM	-KTS						
8760	133.7 (FWO)	0.0 (WID)	0.0	324.0	80.0	CLIMB	CLEAN				

FLT 5
TRK 5
VCD 86
HRS 8
MIN 8
SEC 45
CAP 0



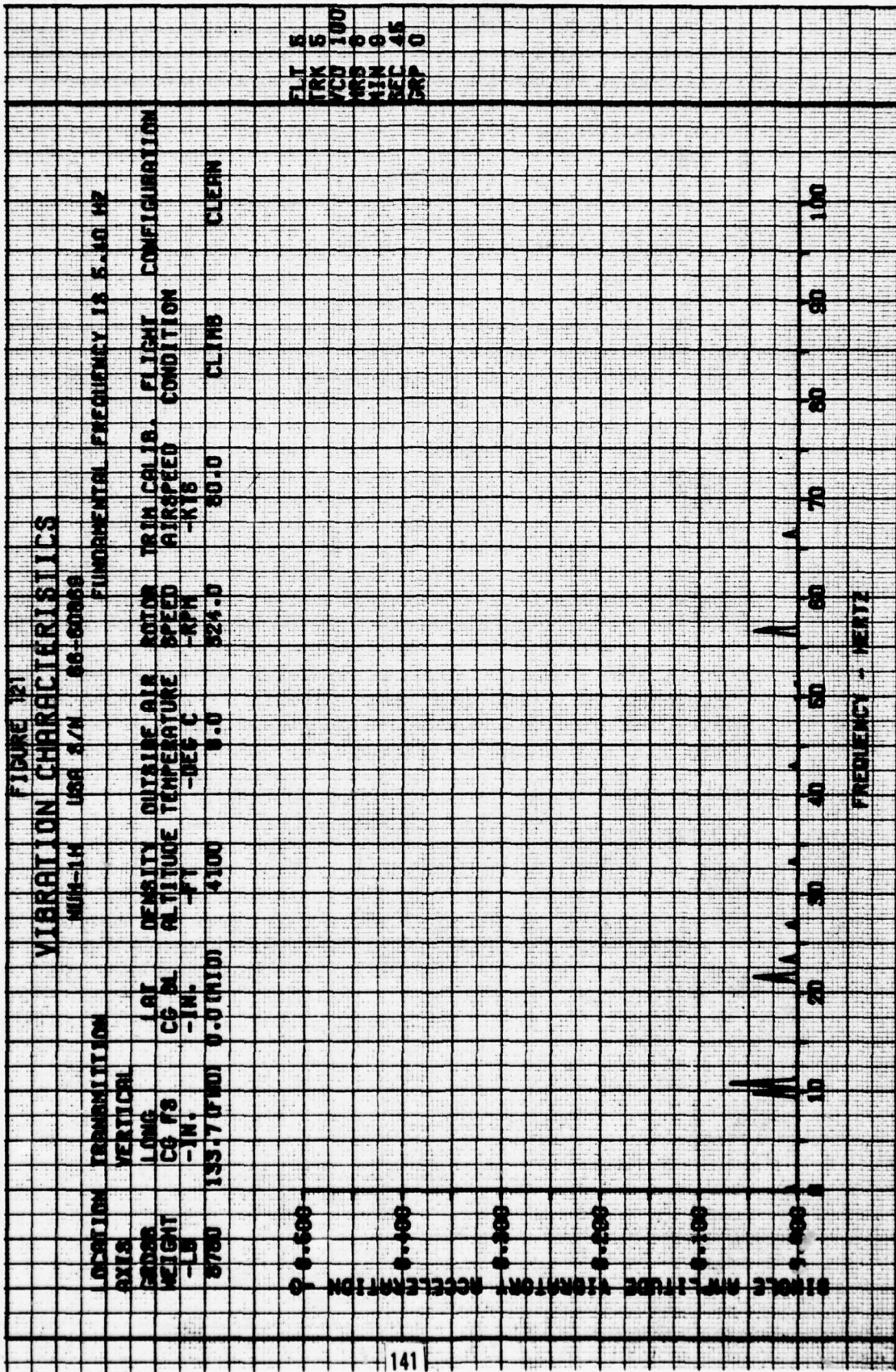


FIGURE 122

VIBRATION CHARACTERISTICS

LOCATION POWER CONVERTER
 AXIS LONGITUDINAL
 CROSS LONG LAT
 WEIGHT CG F3 CG BL
 -LB -IN.
 6780 133.7 (FWD) 0.0 (MID)

DENSITY OUTSIDE AIR ROTOR TRIM CALIB. FLIGHT CONFIGURATION
 ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION
 -FT -DEG C -RPM -KTS
 4100 8.0 324.0 60.0 CLIMB CLEW

FUNDAMENTAL FREQUENCY IS 5.10 HZ

SINGLE AMPLITUDE VIBRATION ACCELERATION
 0.500
 0.400
 0.300
 0.200
 0.100
 0.000

FREQUENCY - HERTZ

100

90

80

70

60

50

40

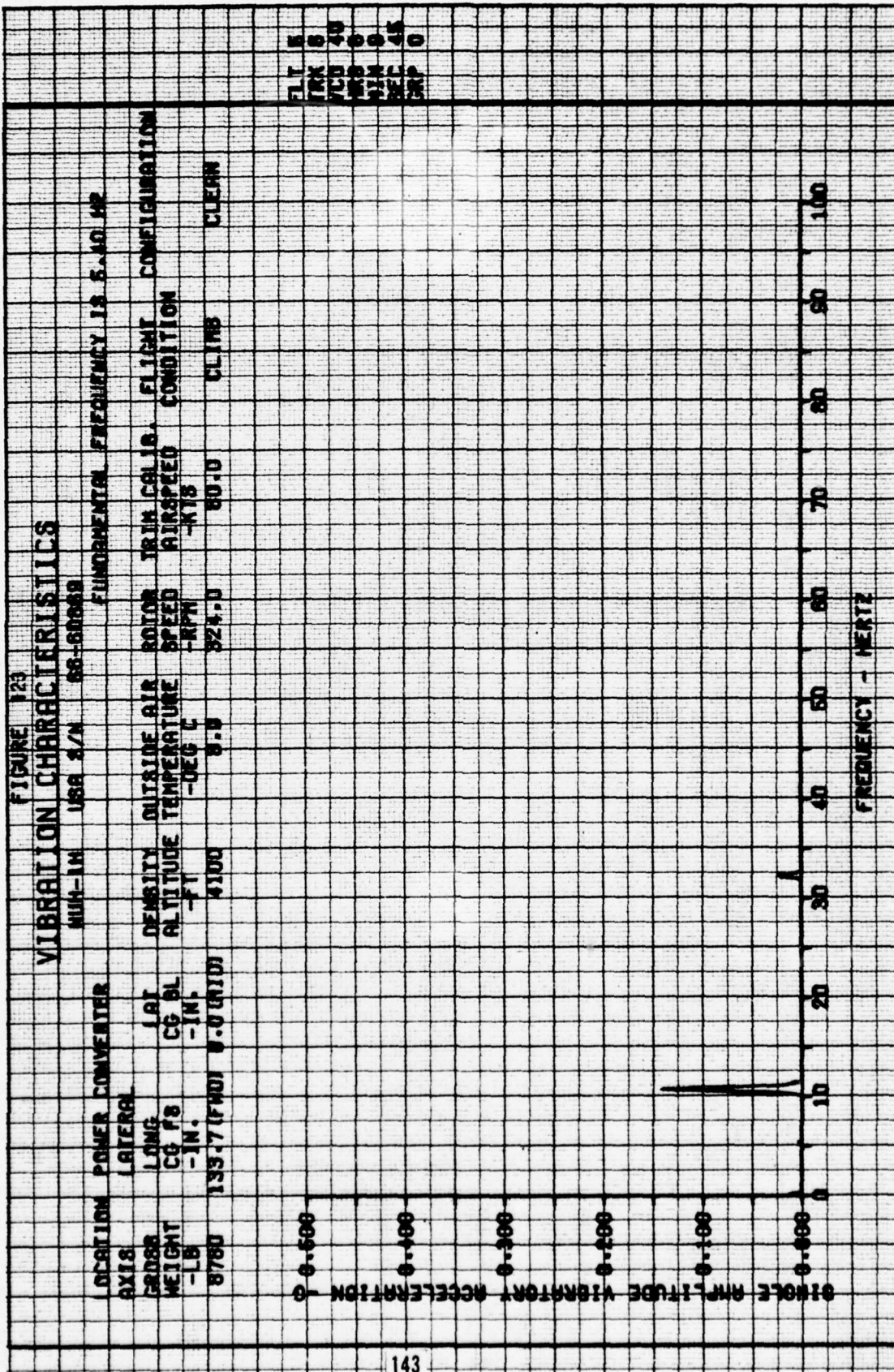
30

20

10

0

FLT 5
 TRA 6
 VCS 25
 HNS 0
 HIN 0
 WTC 45
 CAP 0



FLT 5
 TRK 6
 VCS 40
 CRS 0
 MIN 0
 REC 45
 SRP 0

FIGURE 124

VIBRATION CHARACTERISTICS

LOCATION	POWER CONVERTER	NUM-IN	UBA S/N	68-60089	FUNDAMENTAL FREQUENCY	1A 5.40 HZ
AXIS	VERTICAL	DENSITY	OUTSIDE AIR	ROTOR	IRIN CALIB.	FLIGHT
GROSS	LONG	ALTITUDE	TEMPERATURE	SPEED	RMSPEED	CONDITION
WEIGHT	CG FS	-FT	-DEG C	-RPM	-KTS	
-LB	-IN.	4100	8.0	324.0	80.0	CLEAN
8760	133.7 (FWD)	0.0 (MID)				

FLT 6
TRX 8
VCO 66
WRS 8
MIN 9
SEC 45
CRP 0

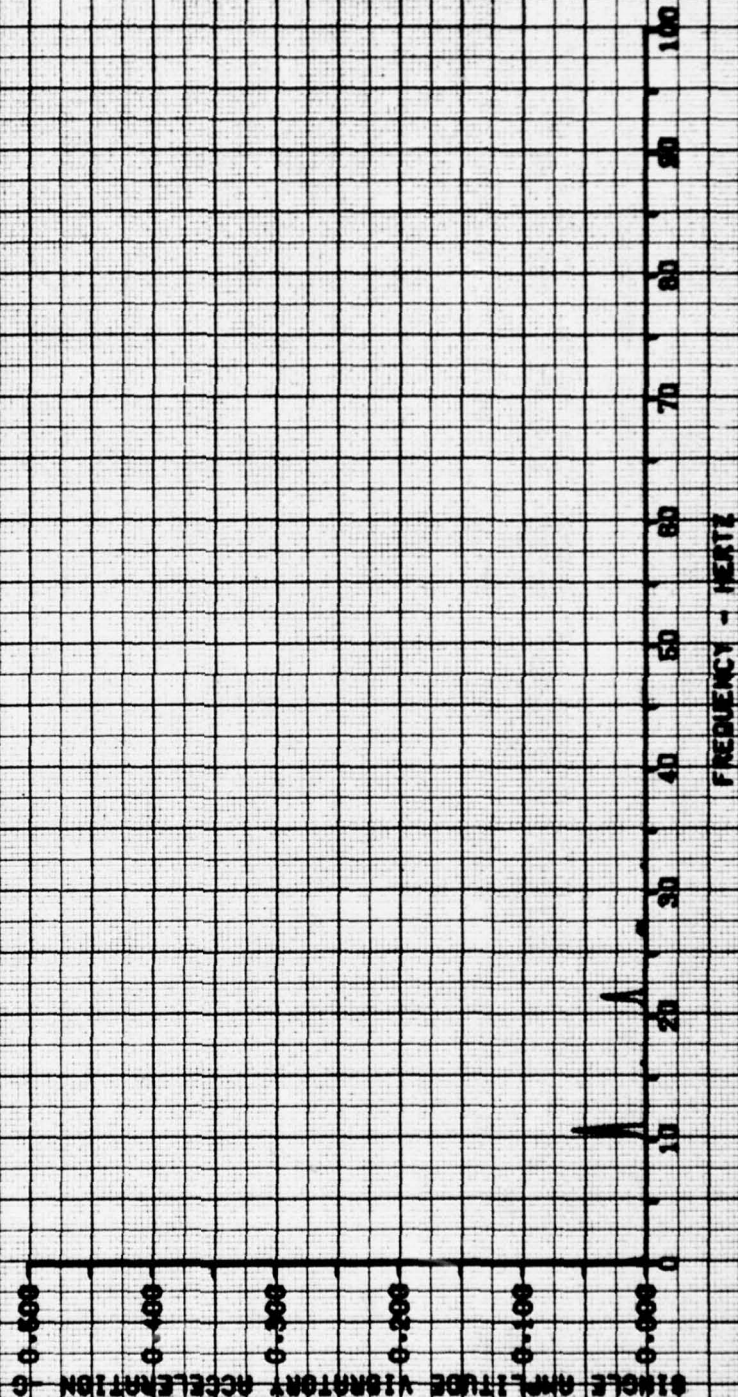


FIGURE 125

VIBRATION CHARACTERISTICS

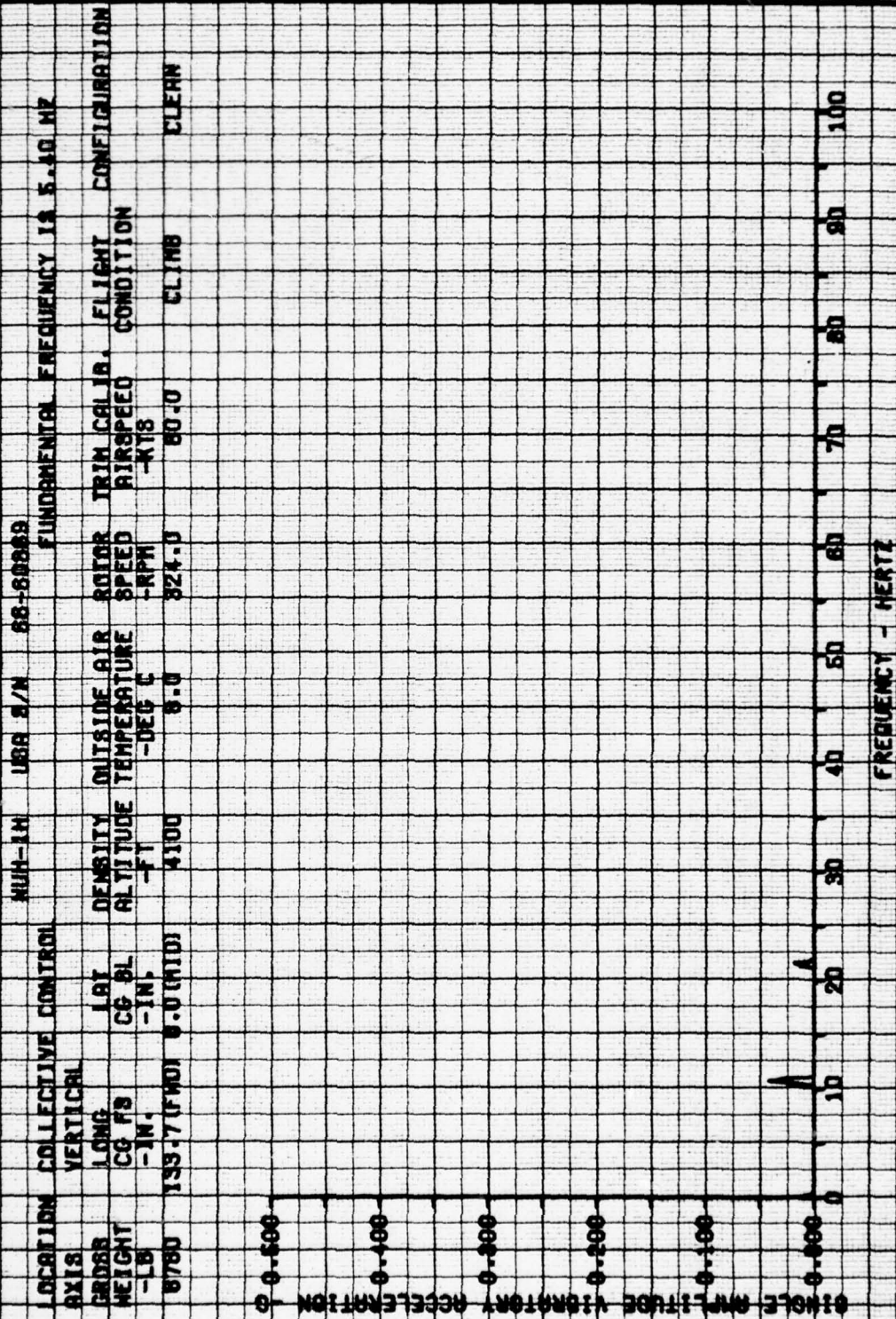


FIGURE 128

VIBRATION CHARACTERISTICS

LOCATION FORWARDED PALLET FLOOR MOUNT
 AXIS VERTICAL
 SESSB LONG
 HEIGHT CG F8
 -IN.
 8760 133.7(FWD) 9.0(NID)

WIM-1M UBR 8/V 88-82869 FUNDAMENTAL FREQUENCY IS 5.15 HZ

DENSITY OUTSIDE AIR ROTOR TRIM CALIB. FLIGHT CONDITION

ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION

-FT -DEG C -RPM -KTS

8100 8.8 324.0 80.0 CLEAN

0 0.200

0 0.400

0 0.600

0 0.800

0 1.000

0 1.200

0 1.400

0 1.600

0 1.800

0 2.000

0 2.200

0 2.400

0 2.600

0 2.800

0 3.000

0 3.200

0 3.400

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0 3.800

0 4.000

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0 4.800

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0 50.000

0 50.200

0 50.400

0 50.600

0 50.800

0 51.000

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FIGURE 23

VIBRATION CHARACTERISTICS

NUH-1H USA S/N 66-60869

FUNDAMENTAL FREQUENCY IS 5.40 HZ

LOCATION	PALET	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.	FLIGHT
AXIS	LONGITUDINAL	ALTITUDE	TEMPERATURE	SPEED	AIR SPEED	CONDITION
28088	LONG	-FT	-DEG C	-RPM	-KTS	
WEIGHT	CG F/S					
-LB	-IN.					
8640	133.1 (FWD)	4120	8.0	524.0	80.0	RIGHT TURN
	0.0 (AID)					CLEAN

FLT 4
TRK 4
VCD 70
HNS 12
MIN 20
SEC 50
GRP 0

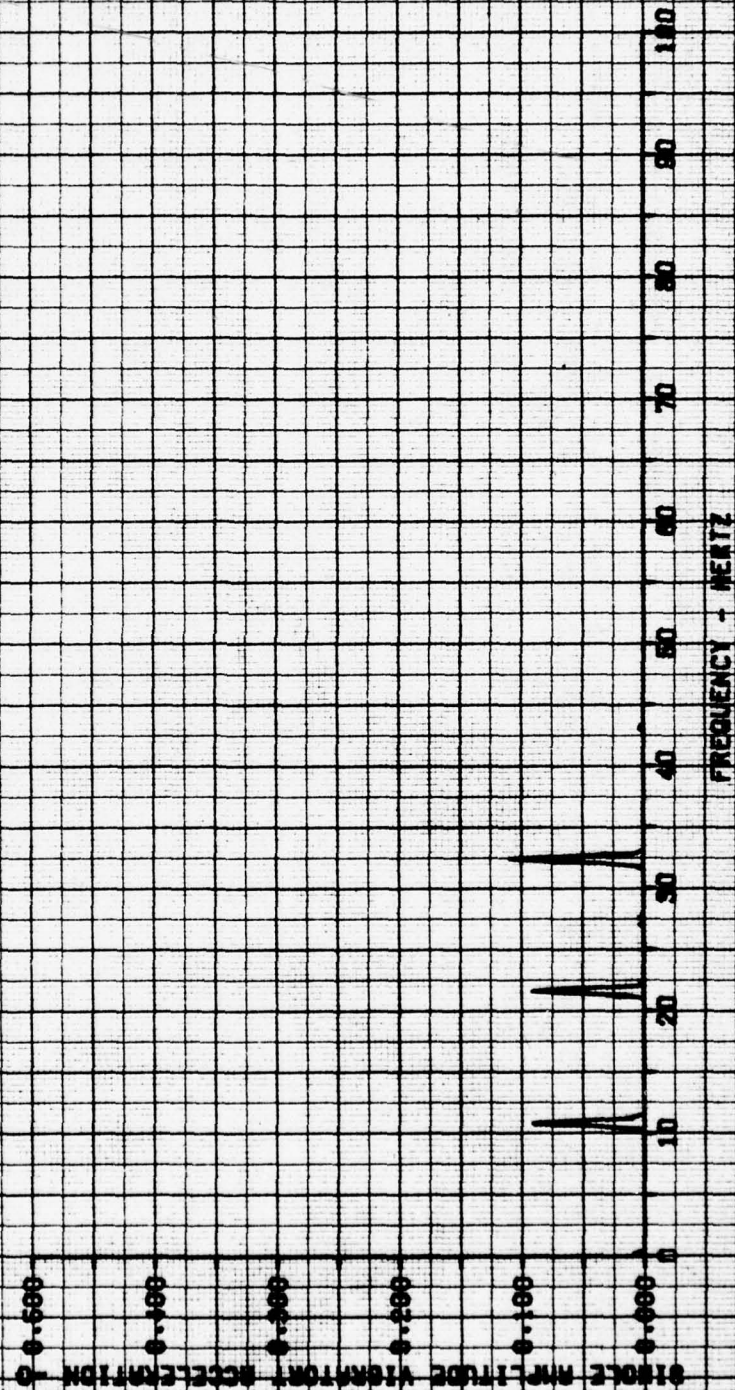


FIGURE 130
VIBRATION CHARACTERISTICS

44-111	168	3/4	56-60869
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FLUORESCENT	FREQUENCY	18	5	40	42
1	100	100	100	100	100
2	100	100	100	100	100
3	100	100	100	100	100
4	100	100	100	100	100
5	100	100	100	100	100
6	100	100	100	100	100
7	100	100	100	100	100
8	100	100	100	100	100
9	100	100	100	100	100
10	100	100	100	100	100
11	100	100	100	100	100
12	100	100	100	100	100
13	100	100	100	100	100
14	100	100	100	100	100
15	100	100	100	100	100
16	100	100	100	100	100
17	100	100	100	100	100
18	100	100	100	100	100
19	100	100	100	100	100
20	100	100	100	100	100
21	100	100	100	100	100
22	100	100	100	100	100
23	100	100	100	100	100
24	100	100	100	100	100
25	100	100	100	100	100
26	100	100	100	100	100
27	100	100	100	100	100
28	100	100	100	100	100
29	100	100	100	100	100
30	100	100	100	100	100
31	100	100	100	100	100
32	100	100	100	100	100
33	100	100	100	100	100
34	100	100	100	100	100
35	100	100	100	100	100
36	100	100	100	100	100
37	100	100	100	100	100
38	100	100	100	100	100
39	100	100	100	100	100
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50	100	100	100	100	100
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52	100	100	100	100	100
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62	100	100	100	100	100
63	100	100	100	100	100
64	100	100	100	100	100
65	100	100	100	100	100
66	100	100	100	100	100
67	100	100	100	100	100
68					

FEEL



DENSITY OUTSIDE AIR
 ALTITUDE TEMPERATURE
 -FT -DEG C

0.428	0.0	0.217
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[illegible]

324.0	80.0	RIGHT TURN	CLEAN
-------	------	------------	-------

FLI	4	86
TRK	4	12
WCD	20	50
HRS	50	0
MIN		
SEC		
GRP		

FREQUENCY - HERTZ

150

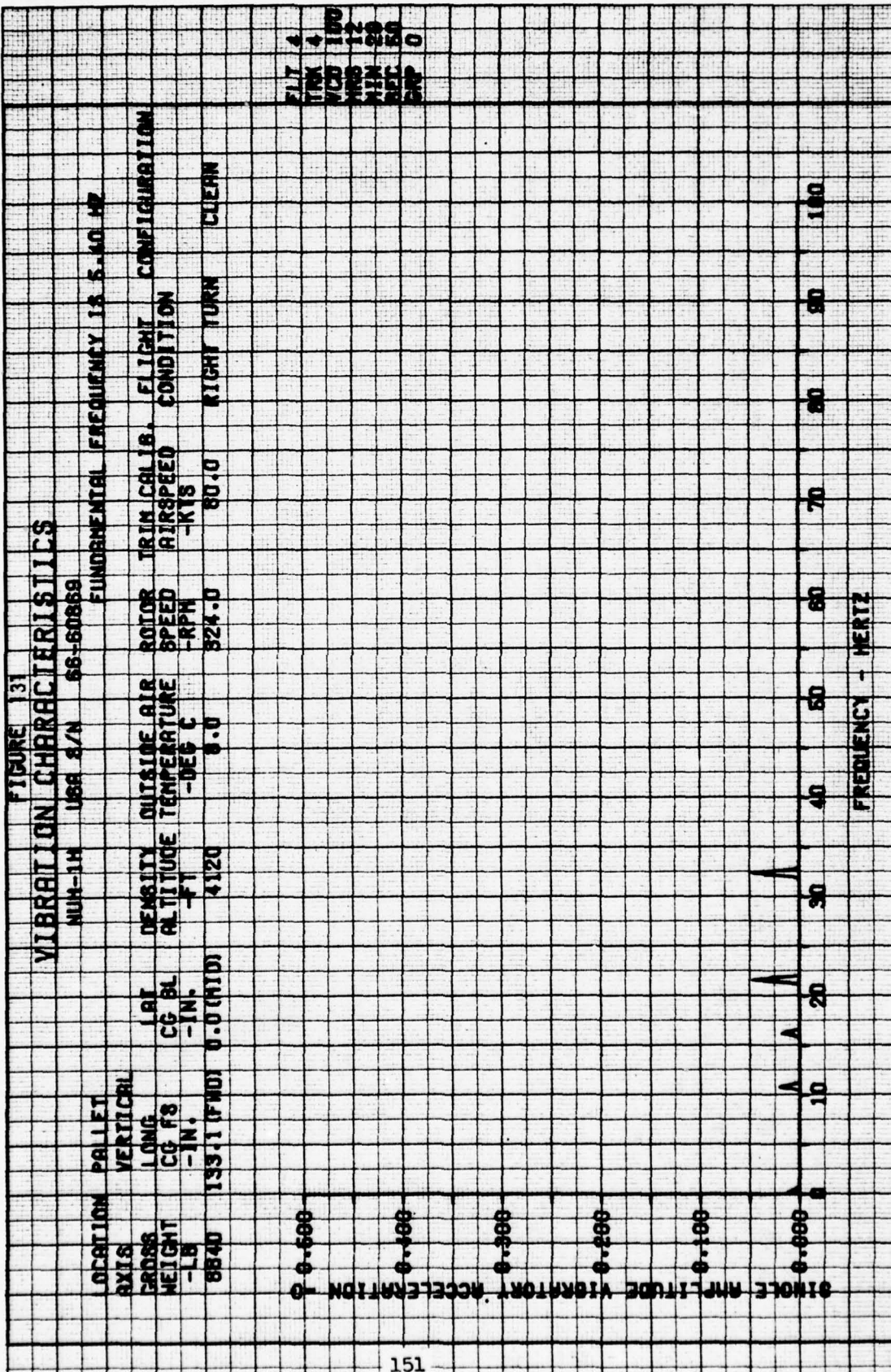


FIGURE 132

VIBRATION CHARACTERISTICS

LOCATION PILOT SEAT
 AXIS LONGITUDINAL
 CROSS LONG
 WEIGHT CG F3
 -IN.
 8540 133.1 (FWD) 0.0 (AID)
 DENSITY OUTSIDE AIR ROTOR TRIM CALIB. FLIGHT CONDITION
 ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION
 -FT. -DEG C -RPM -KTS
 4120 0.0 324.0 80.0 NIGHT TURN CLIMB

NUH-1M USA 8/N 66-60868
 FUNDAMENTAL FREQUENCY IS 5.50 HZ

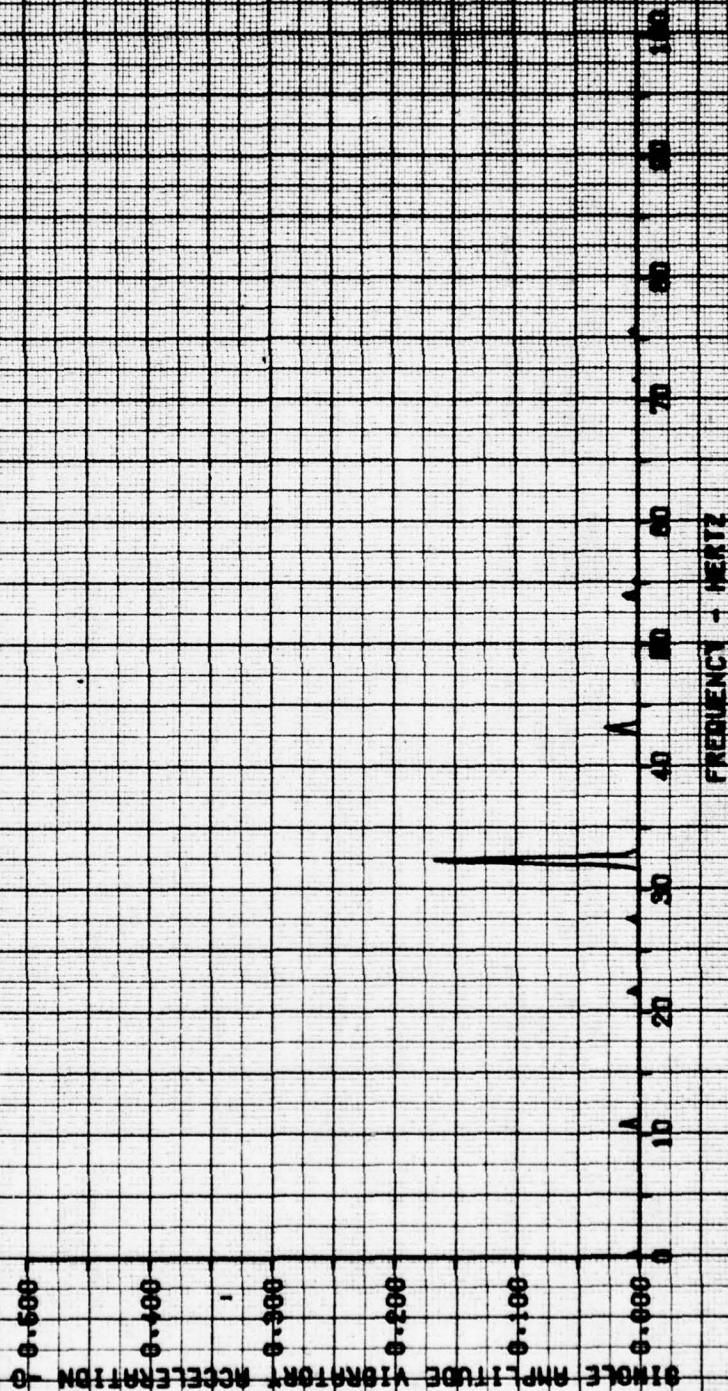


FIGURE 1B3

VIBRATION CHARACTERISTICS

NUH-1H USA 2/N 66-60869

FUNDAMENTAL FREQUENCY IS 5.40 HZ

LOCATION PILOT SEAT

AXIS LATERAL

LONG

CG FS

-IN.

133.1 (FWD) 0.0 (HD)

LAT

CG BL

-IN.

4120

DENSITY

ALTITUDE

-FT

0.0

OUTSIDE AIR

TEMPERATURE

-DEG C

80.0

ROTOR

SPEED

-RPM

324.0

TRIM CALIB.

AIR SPEED

-KTS

80.0

FLIGHT

CONDITION

RIGHT TURN

CLEAN

FLT 4
TRK 5
VCS 40
HRS 12
MIN 20
SEC 50
GRP 0

0.000

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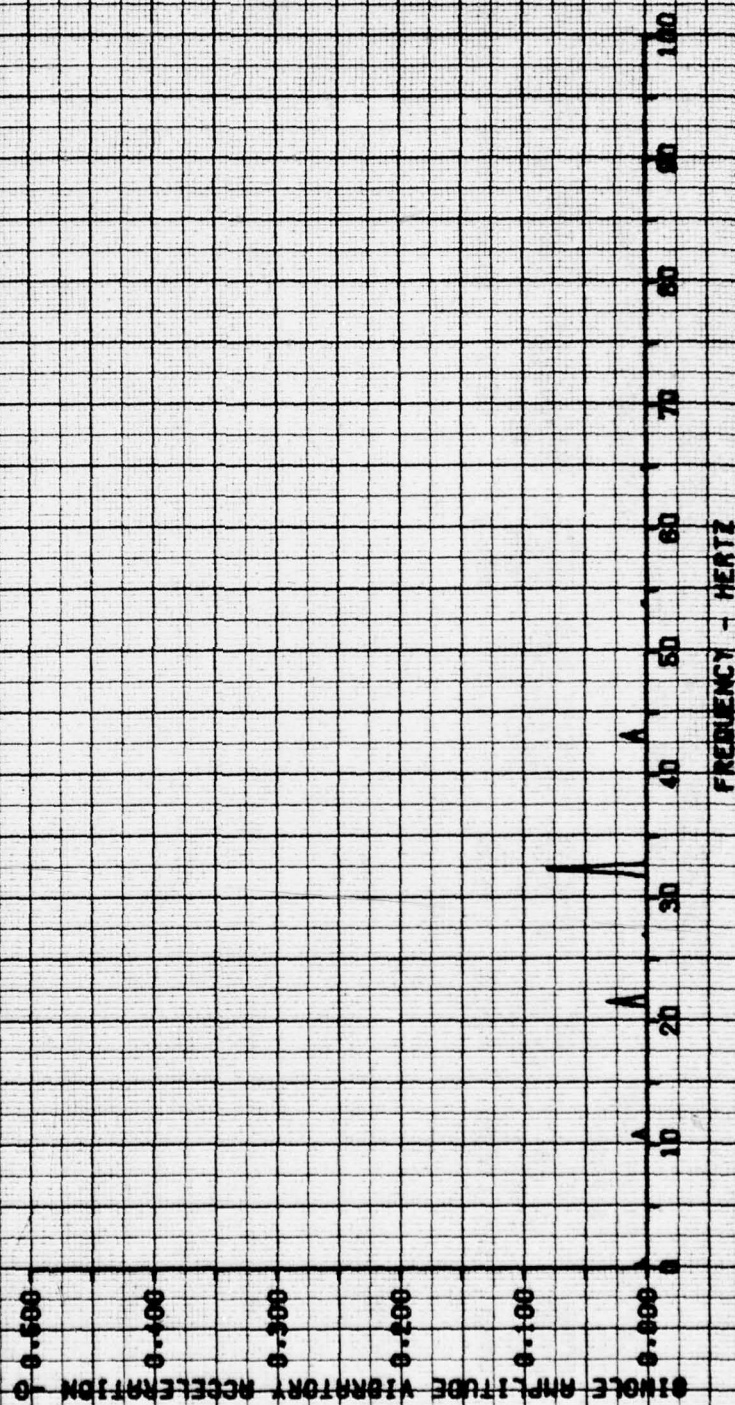
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FIGURE 134

VIBRATION CHARACTERISTICS

LOCATION	P1 OT BEAT	NUM-14	USA S/A	68-50868	FUNDAMENTAL FREQUENCY	13.5-10 HZ
AXIS	VERTICAL					
GROSS WEIGHT	LONG	DENSITY	OUTSIDE AIR	ROTOR SPEED	TRIM CALIB.	FLIGHT CONFIGURATION
-LB	CG FS	-FT	TEMPERATURE	-RPH	AIR SPEED	CONDITION
	-IN.		-DEG C		-KTS	
8840	133.1 (FWO)	4120	8.0	324.0	80.10	RIGHT TURN
	0.0 (HTD)					CLEAN

FLT 4
TRM 5
VCS 55
WRS 12
HIM 29
SEC 58
CRP 0



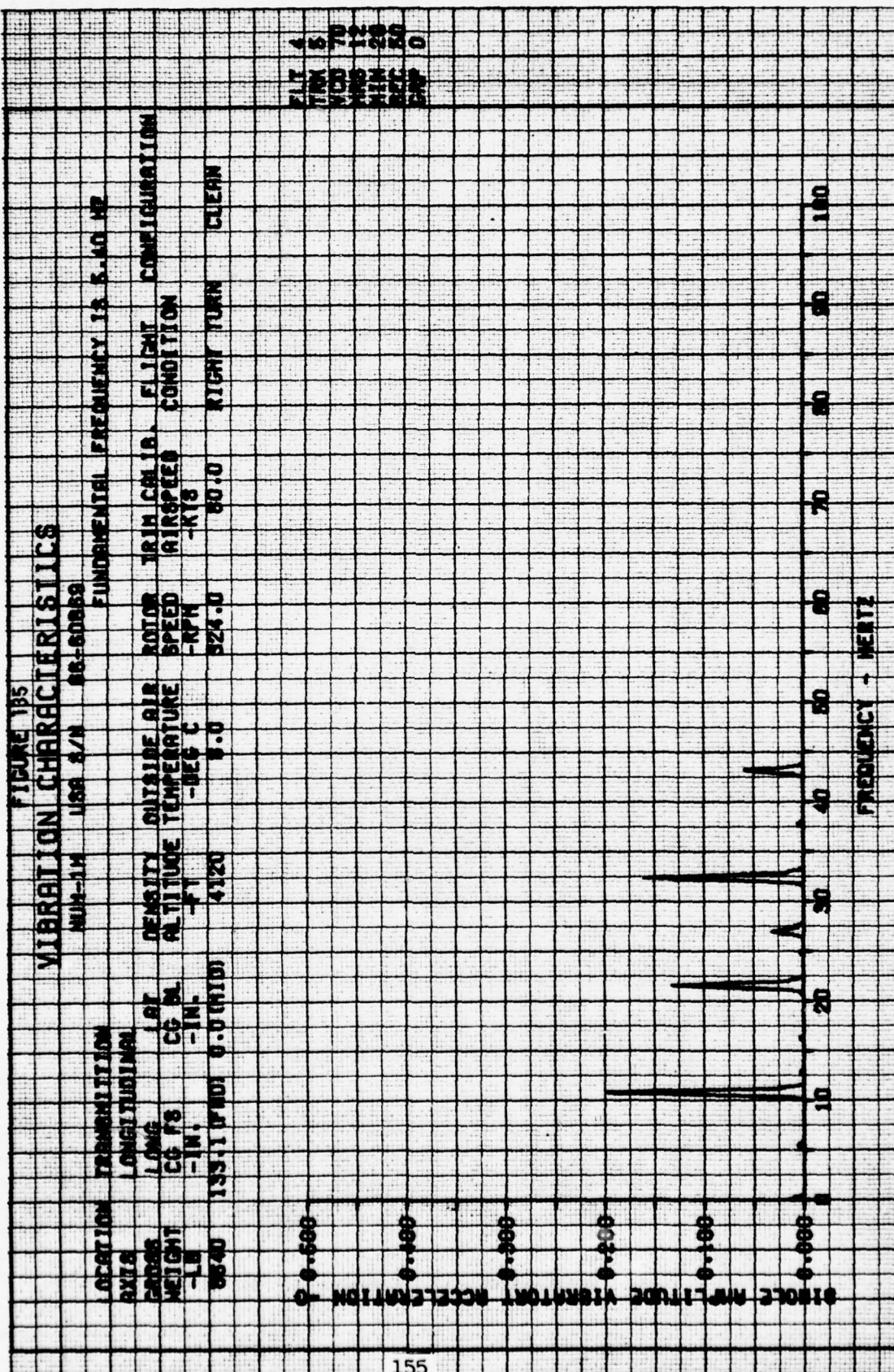


FIGURE 136

VIBRATION CHARACTERISTICS

LOCATION TRANSMISSION
 AXIS LATERAL
 80000
 WEIGHT -LB
 8840
 139.1 (FWD) 0.0 (MID)
 CG FB
 -IN.
 CG BL
 -IN.
 LAI
 DENSITY OUTSIDE AIR ROTOR TRIM CALIB. FLIGHT CONFIGURATION
 ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION
 -FT -DEG C -RPM -KTS
 4120 0.0 924.0 80.0 RIGHT TURN CLEAN
 FUNDAMENTAL FREQUENCY IS 5.40 HZ

FLT 4
 TRM 5
 VCD 86
 HRS 12
 MIN 29
 SEC 58
 GRP 0

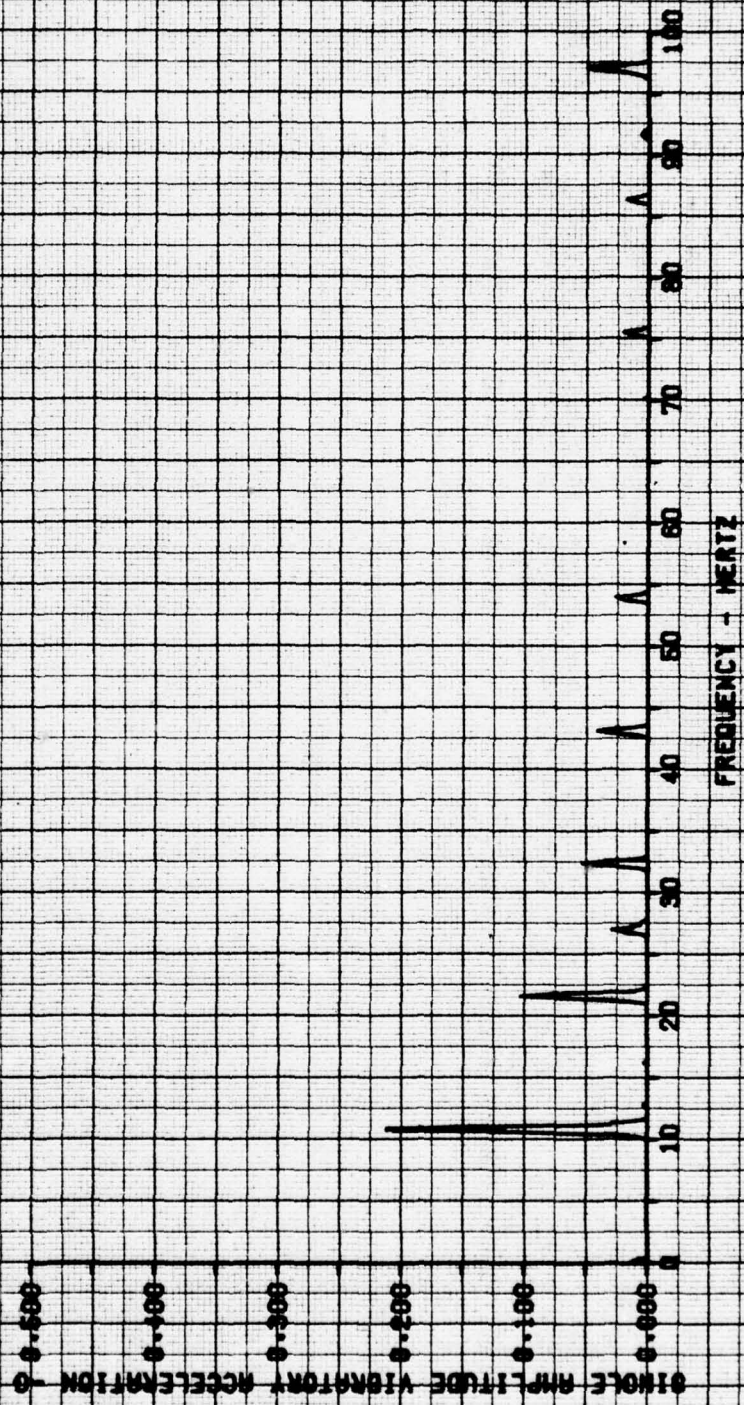


FIGURE 137

VIBRATION CHARACTERISTICS

LOCATION TRANSMISSION
 AXIS VERTICAL
 PROBE LONG
 WEIGHT CG FS
 -IN.
 3540 133.1 (FWD) 0.0 (MID)

DENSITY OUTSIDE AIR ROTOR TRIM CALIB. FLIGHT CONFIGURATION
 ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION
 -FT -DEG C -RPH -KTS
 4120 0.0 324.0 80.0 NIGHT TURN CLEAN

NUH-1H USA S/N 68-80869 FUNDAMENTAL FREQUENCY IS 5.10 HZ

ZLT 4
 TRM 5
 VCO 100
 MAG 12
 MIN 20
 SET 20
 SWP 0

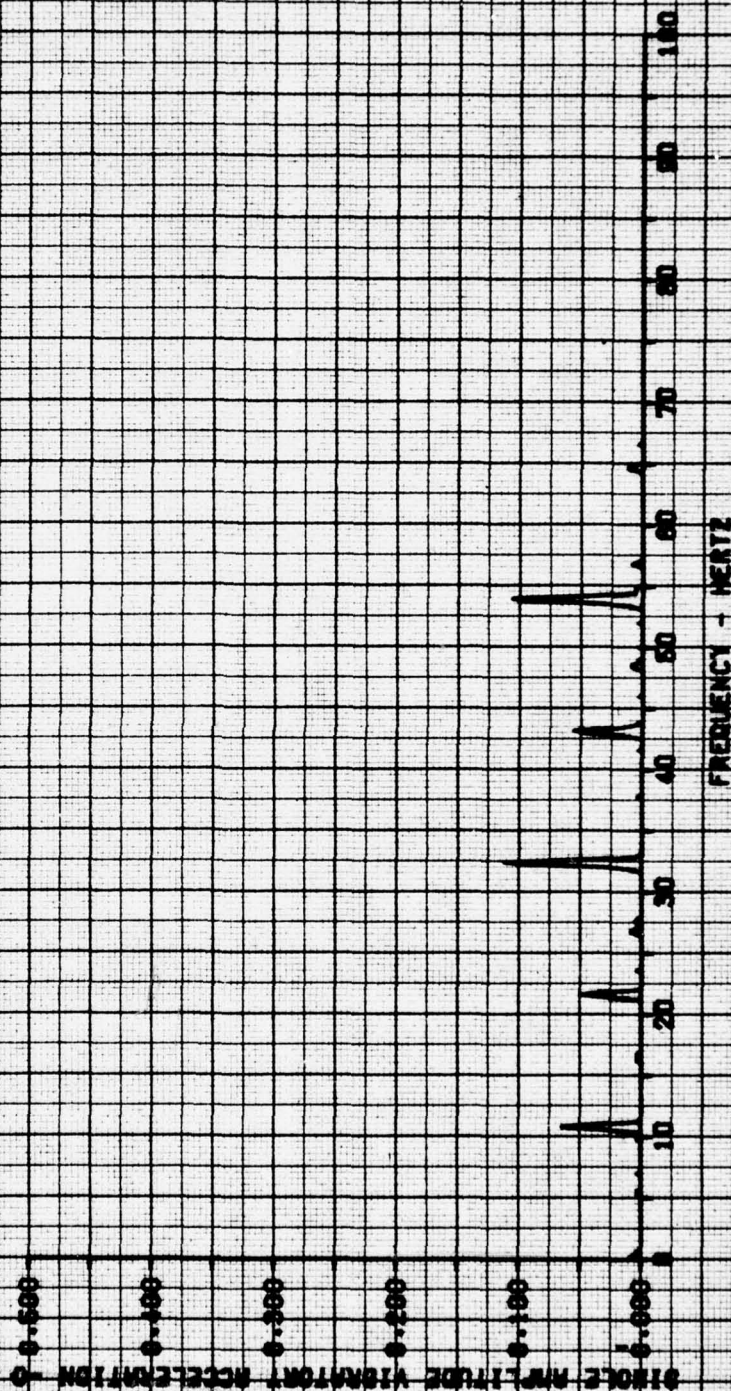
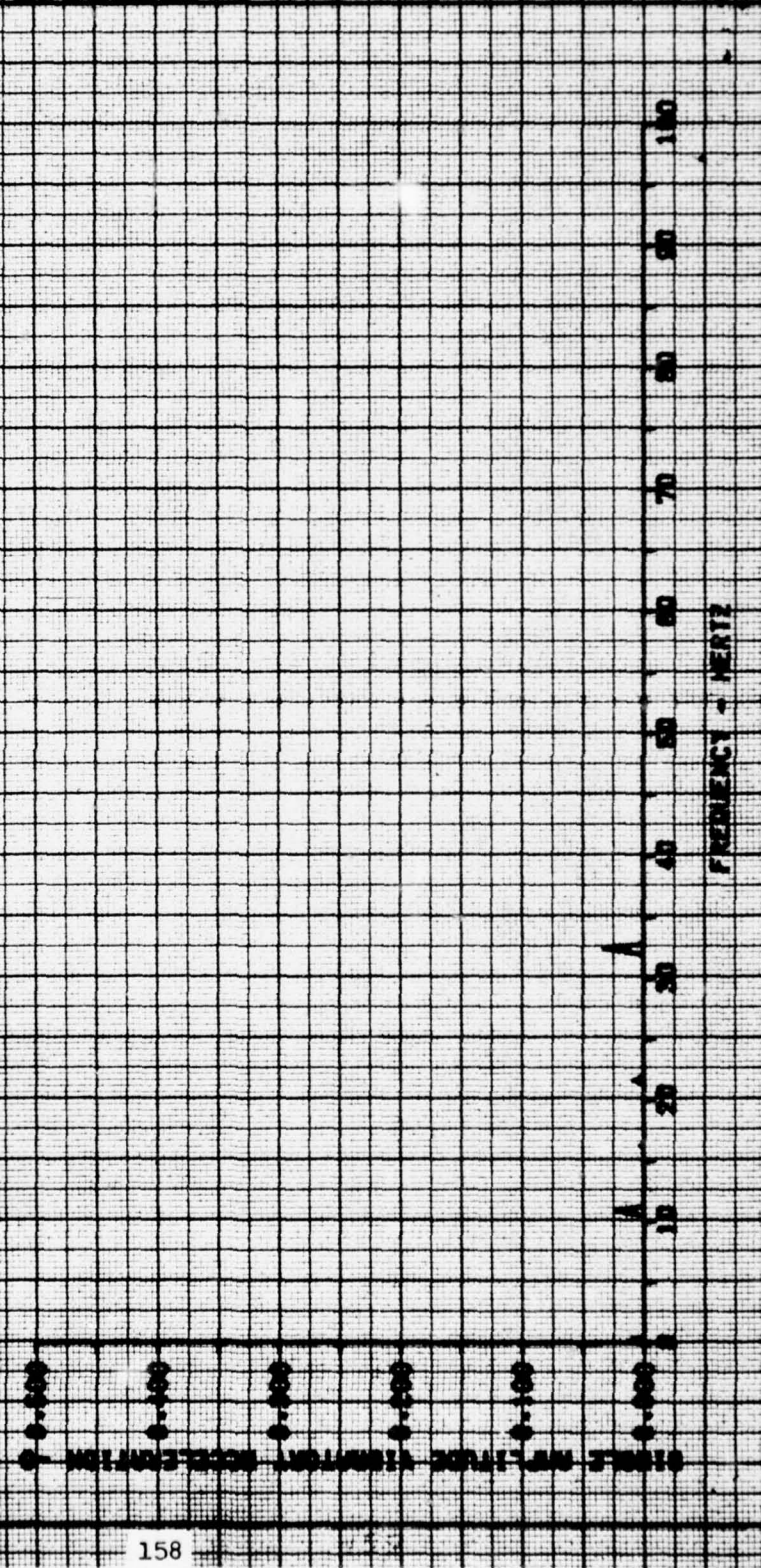


FIGURE 138
VIBRATION CHARACTERISTICS

ENGINE POWER CONVERTER	WUB 2/3	88-80888	FUNDAMENTAL FREQUENCY IS 5.40 HZ
EXIS LONGITUDINAL			
LONG			
CG FL	DENSITY	OUTSIDE AIR	TRIN CALS. FLIGHT
CG FB	ALTITUDE	TEMPERATURE	AIRSPED CONDITION
-IN.	-FT	-DEG C	-KTS
WUB	4120	8.8	824.0
138.10000	0.0000		80.0
			NIGHT TURN
			CLEAR



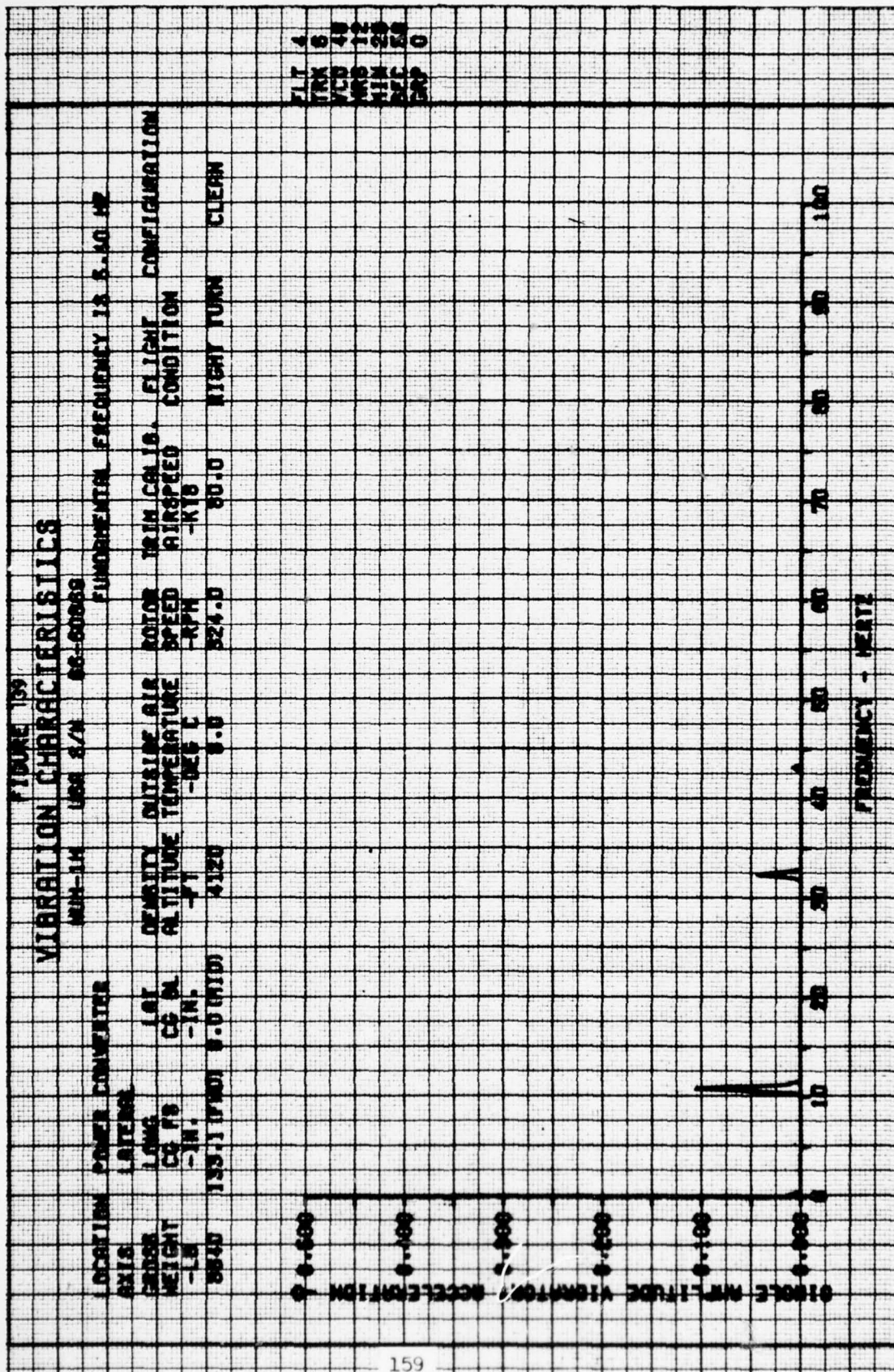


FIGURE 140

VIBRATION CHARACTERISTICS

LOCATION	POWER CONVERTER	MUH-1H	USA 8/A	66-60889	FUNDAMENTAL FREQUENCY IS 5.40 HZ
AXIS	VERTICAL				
GROSS WEIGHT	LONG	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.
-LB	CG FS	ALTITUDE	TEMPERATURE	SPEED	FLIGHT CONDITION
	-IN.	-FT	-DEG C	-RPM	-KTS
8840	139.1 (FWD) 0.0 (MID)	4120	0.0	324.0	80.0
					RIGHT TURN
					CLEAR

FLT 4
TRN 6
VCD 58
MRS 12
MIN 28
SEC 58
CRP 0

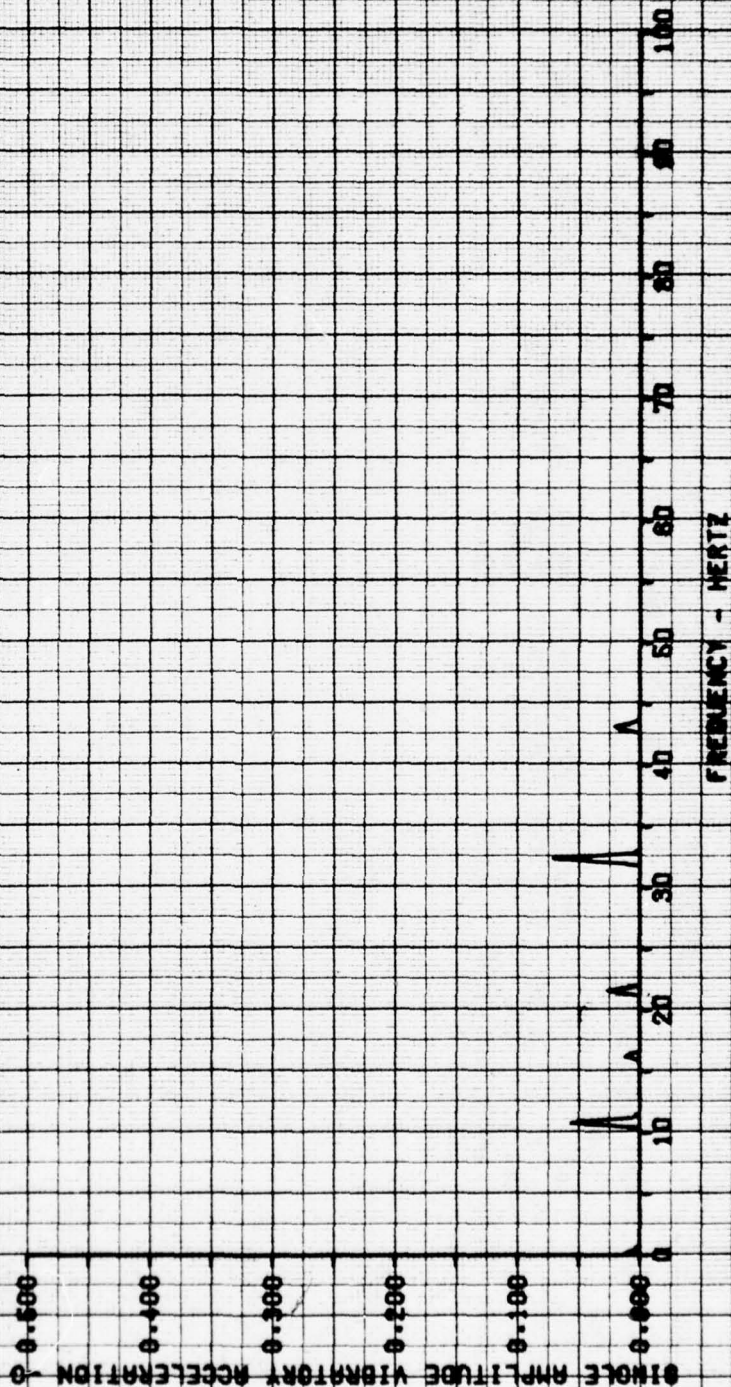


FIGURE 14 VIBRATION CHARACTERISTICS

WJ4-14 1530 8/74 23-00000
PLANTMASTER FREQUENCY 13.5-10.14

POSITIVE COLLECTIVE CONTROL

813 777 1274

2003 1 Q4

878
1011

THE

01-021 0408

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FTD

Ind.

PROPERTY OUTSIDE AIR

ALTITUDE	TEMPERATURE
10000	67
9000	68
8000	69
7000	70
6000	71
5000	72
4000	73
3000	74
2000	75
1000	76
Sea Level	77

1-4

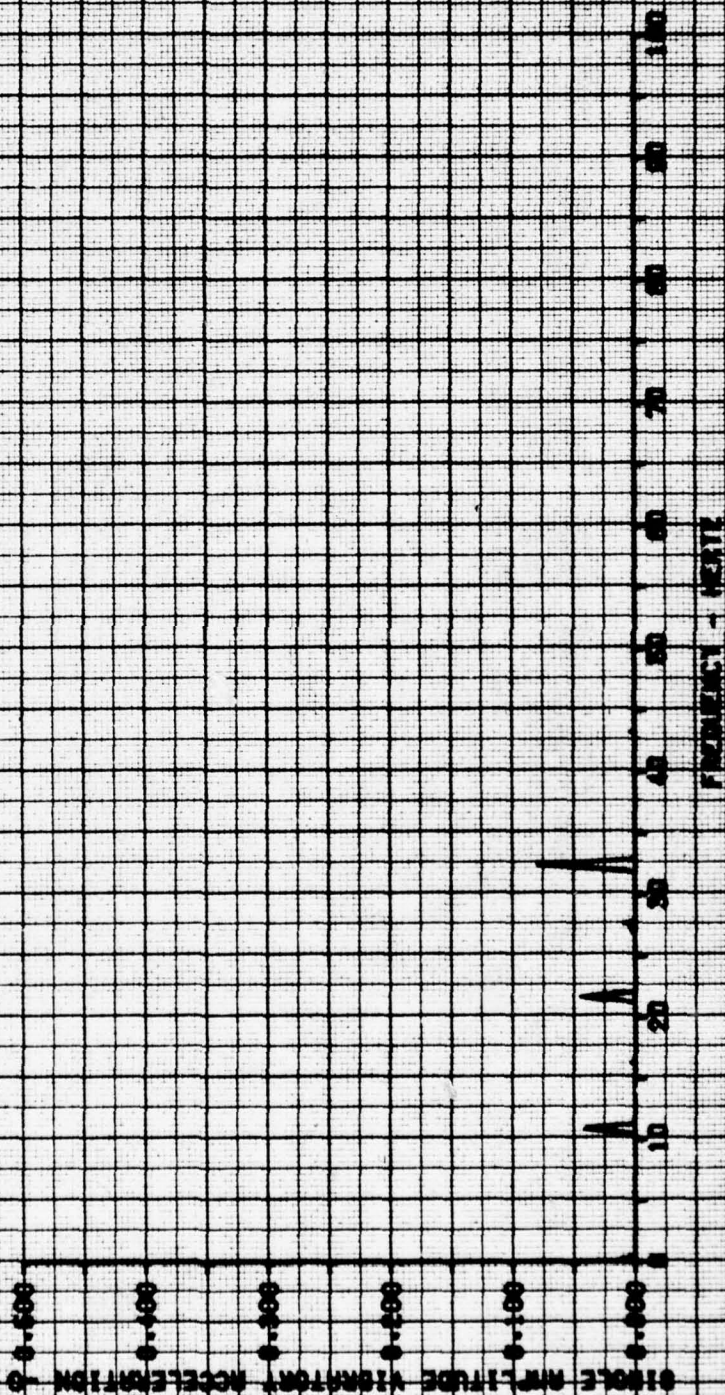
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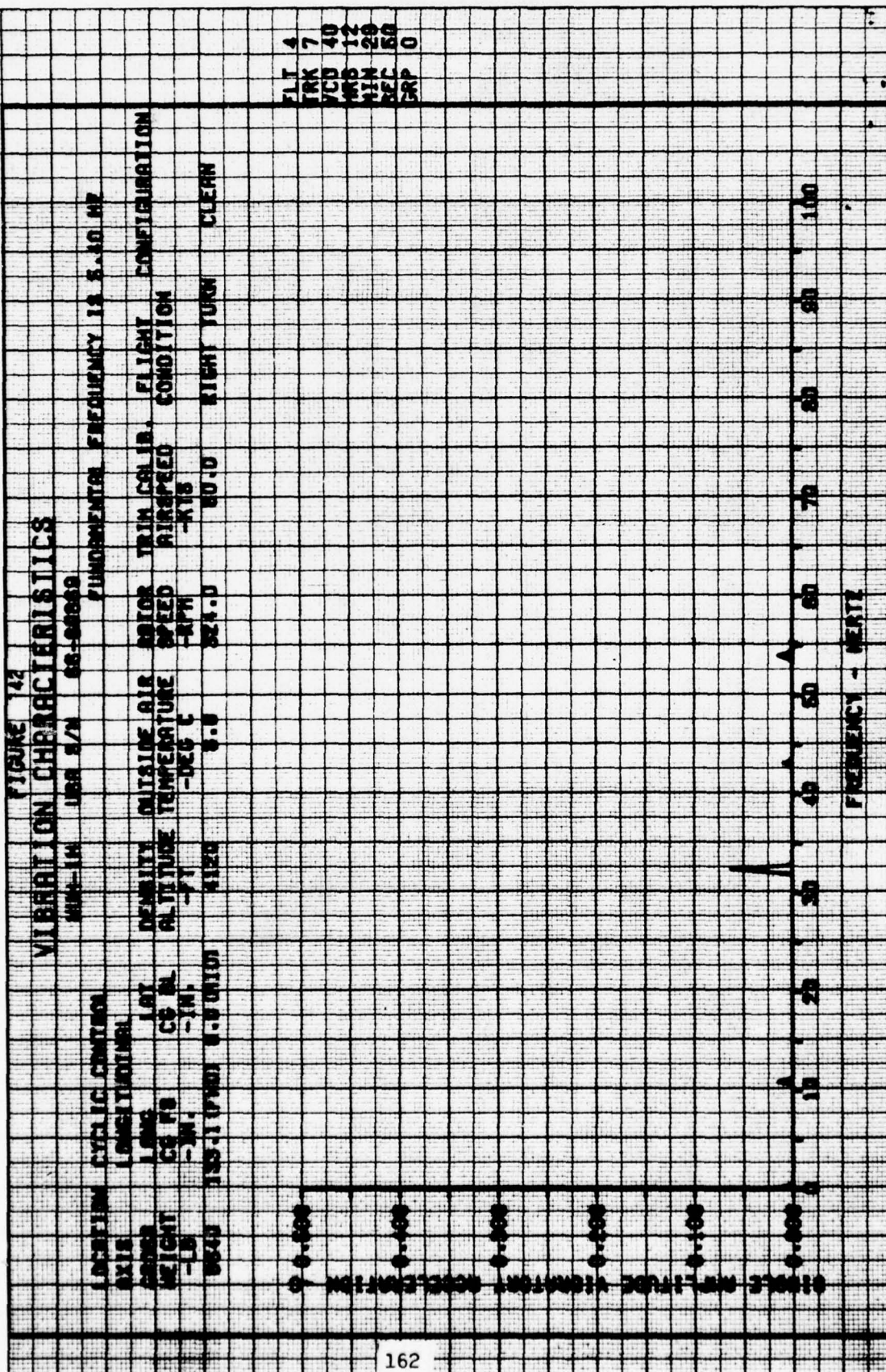
WORLD TRIP CAR. FIFTY

DATE	AIRPORT	CONDITION
DEC 28	MEMPHIS	GOOD
DEC 29	MEMPHIS	GOOD
DEC 30	MEMPHIS	GOOD
DEC 31	MEMPHIS	GOOD
JAN 1	MEMPHIS	GOOD
JAN 2	MEMPHIS	GOOD
JAN 3	MEMPHIS	GOOD
JAN 4	MEMPHIS	GOOD
JAN 5	MEMPHIS	GOOD
JAN 6	MEMPHIS	GOOD
JAN 7	MEMPHIS	GOOD
JAN 8	MEMPHIS	GOOD
JAN 9	MEMPHIS	GOOD
JAN 10	MEMPHIS	GOOD
JAN 11	MEMPHIS	GOOD
JAN 12	MEMPHIS	GOOD
JAN 13	MEMPHIS	GOOD
JAN 14	MEMPHIS	GOOD
JAN 15	MEMPHIS	GOOD
JAN 16	MEMPHIS	GOOD
JAN 17	MEMPHIS	GOOD
JAN 18	MEMPHIS	GOOD
JAN 19	MEMPHIS	GOOD
JAN 20	MEMPHIS	GOOD
JAN 21	MEMPHIS	GOOD
JAN 22	MEMPHIS	GOOD
JAN 23	MEMPHIS	GOOD
JAN 24	MEMPHIS	GOOD
JAN 25	MEMPHIS	GOOD
JAN 26	MEMPHIS	GOOD
JAN 27	MEMPHIS	GOOD
JAN 28	MEMPHIS	GOOD
JAN 29	MEMPHIS	GOOD
JAN 30	MEMPHIS	GOOD
JAN 31	MEMPHIS	GOOD

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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1971-72 0.38 0.438





FLT 4
TRK 7
VCD 40
MS 12
MIN 20
SEC 50
GRP 0

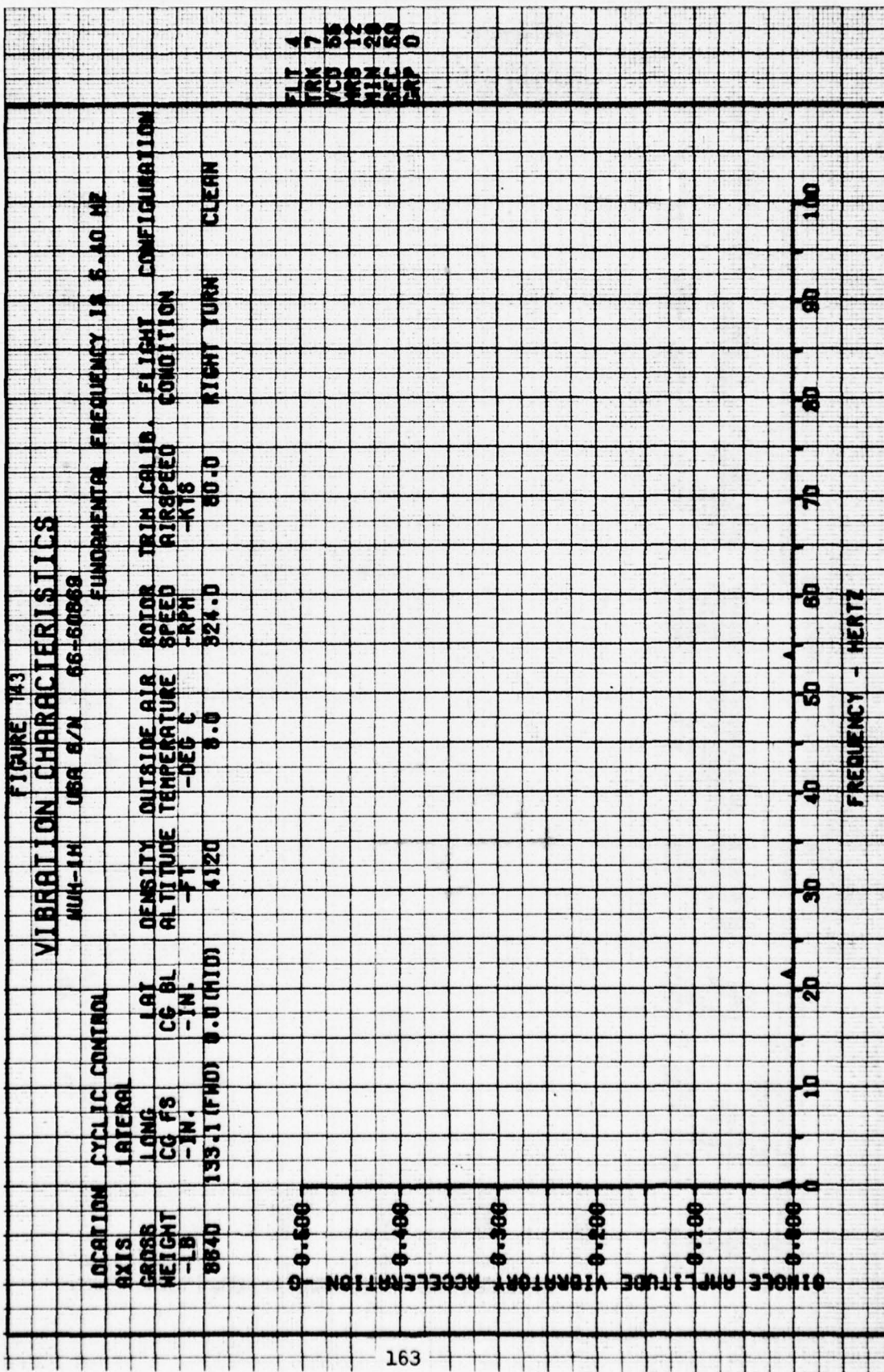
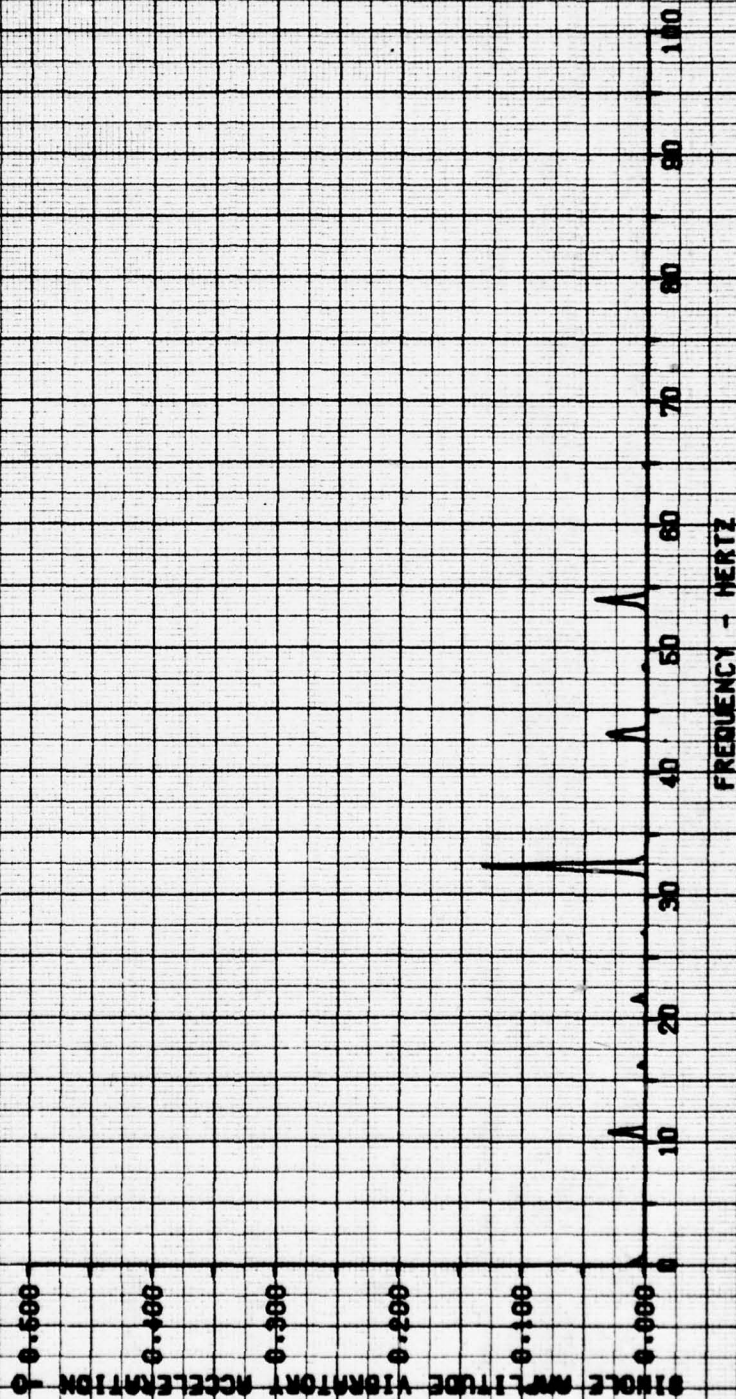


FIGURE 144

VIBRATION CHARACTERISTICS

LOCATION FORWARD PELLET FLOOR JOINT
 AXIS VERTICAL
 GROSS WEIGHT - LB 8840
 LONG. CG F'S -IN. 133.1 (FWD)
 LAT. CG BL -IN. 0.0 (MID)
 DENSITY ALTITUDE TEMPERATURE -FT 4120
 OUTSIDE AIR SPEED -KPH 324.0
 ROTOR TRIM CALIB. AIRSPEED -KTS 80.0
 FLIGHT CONDITION RIGHT TURN
 CLEAN
 FUNDAMENTAL FREQUENCY 13.540 HZ



FLT 4
 TRK 7
 VCO 70
 HRS 12
 MIN 20
 SEC 50
 GAP 0

FIGURE 145

VIBRATION CHARACTERISTICS

LOCATION PALET		NUH-1H		USA S/N		68-60859		FUNDAMENTAL FREQUENCY IS 5.40 HZ	
AXIS	LONGITUDINAL	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.	FLIGHT	CONFIGURATION		
WDRSS	LONG	ALTITUDE	TEMPERATURE	SPEED	AIR SPEED	CONDITION			
WEIGHT	CG #8	-FT	-DEG C	-RPM	-KTS				
-LB	-IN.								
8240	135.4 (FWD)	0.0 (H/D)	4220	9.0	324.0	80.0	LEFT TURN	CLEAN	

FLT 5
TRK 4
VCO 70
MRS 7
MIN 27
SEC 10
GRP 0

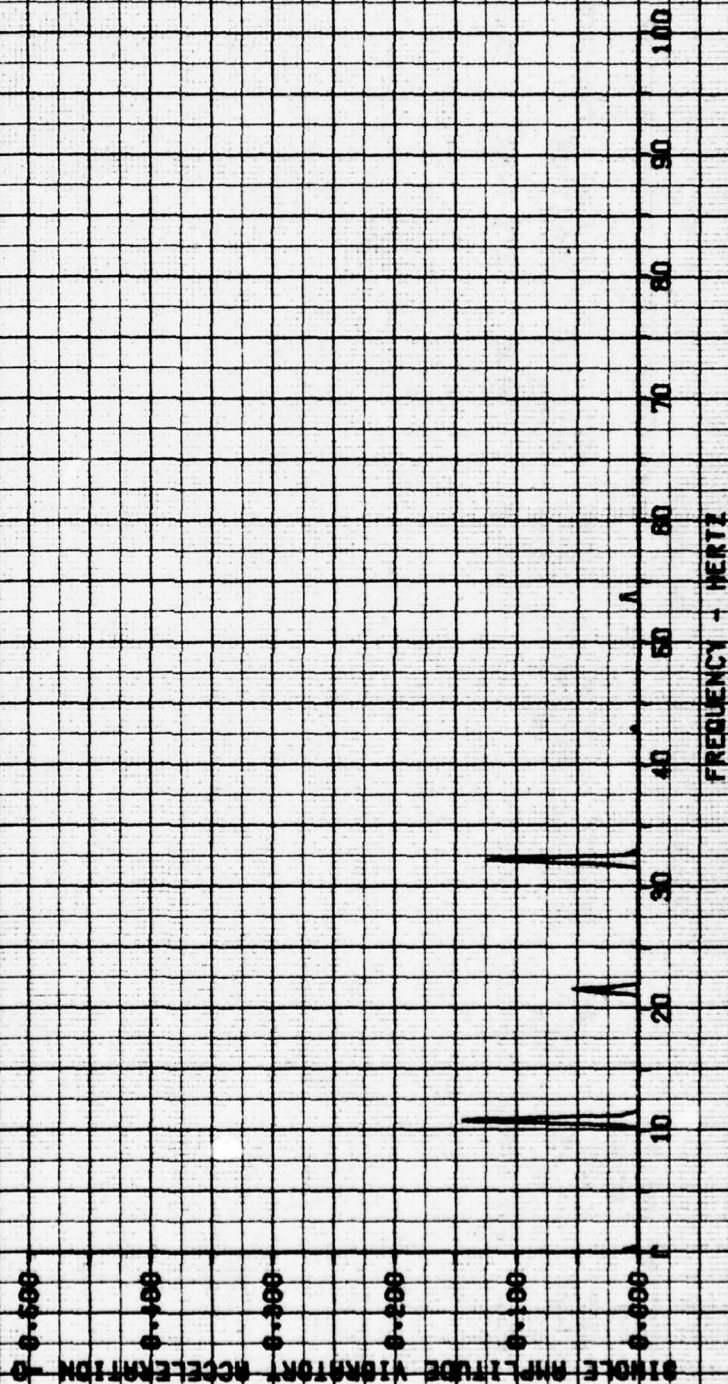


FIGURE 147

VIBRATION CHARACTERISTICS

WU-11H USA S/N 66-50869

FUNDAMENTAL FREQUENCY IS 5.40 HZ

LOCATION PALETT
AXIS VERTICAL

GROSS
WEIGHT
-LB

9240 135.4 (FWD) 0.0 (AID)

LAI
CG BL
-IN.

9240 135.4 (FWD) 0.0 (AID)

DENSITY
ALTITUDE
-FT

9240 135.4 (FWD) 0.0 (AID)

OUTSIDE AIR
TEMPERATURE
-DEG C

9240 135.4 (FWD) 0.0 (AID)

ROTOR
SPEED
-RPM

9240 135.4 (FWD) 0.0 (AID)

TRIM CALIB. FLIGHT
AIRSPEED
-KTS

9240 135.4 (FWD) 0.0 (AID)

CONDITION
LEFT TURN

9240 135.4 (FWD) 0.0 (AID)

CONFIGURATION
CLEAN

9240 135.4 (FWD) 0.0 (AID)

FLT 5
TRK 4
VCO 100
HRS 7
MIN 27
SEC 10
GRP 0

SINGLE AMPLITUDE VIBRATION ACCELERATION



FREQUENCY - HERTZ

FIGURE 18 VIBRATION CHARACTERISTICS

LOCATION PILOT SEAT
 AXIS LATERAL
 CROSS LONG
 WEIGHT CG FS
 -IN.
 9240 135.4 (PHOT) 8.0 (NID) 4220
 DENSITY OUTSIDE AIR MOTOR TRIM CALIB. FLIGHT CONFIGURATION
 ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION
 -FT -DEG C -RPM -KTS
 9240 8.0 524.0 80.0 LEFT TURN CLEAN
 FUNDAMENTAL FREQUENCY IS 5.40 Hz
 MIN-1H 1000 5/11 08-000000
 FLT 5
 TRK 6
 VCD 40
 HRS 7
 MIN 27
 SEC 10
 CRP 0

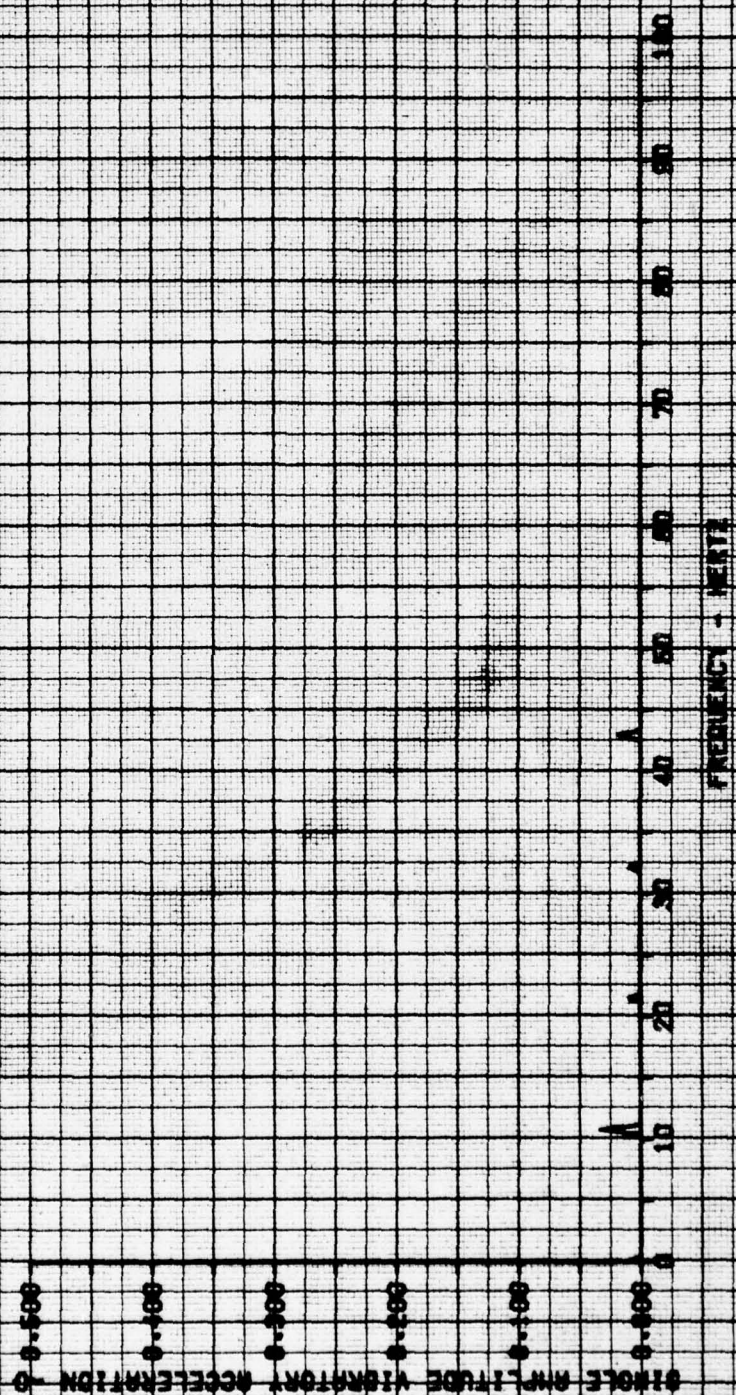


FIGURE 150

VIBRATION CHARACTERISTICS

LOCATION PILOT SEAT
 AXIS VERTICAL
 CROSS LONG
 WEIGHT CG F8
 -IN.
 9240 135.4 (FWD) 0.0 (MID)
 LAI CG AL
 -IN.
 4220 0.0
 DENSITY OUTSIDE AIR ROTOR TRIM CALIB. FLIGHT CONFIGURATION
 ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION
 -FT -DEG C -RPM -KTS
 4220 0.0 524.0 80.0 LEVEL
 FUNDAMENTAL FREQUENCY IS 3.30 HZ
 CLEAN

FLT 5
 TRAX 5
 VCS 55
 HNS 7
 MIN 27
 REC 10
 CRP 0

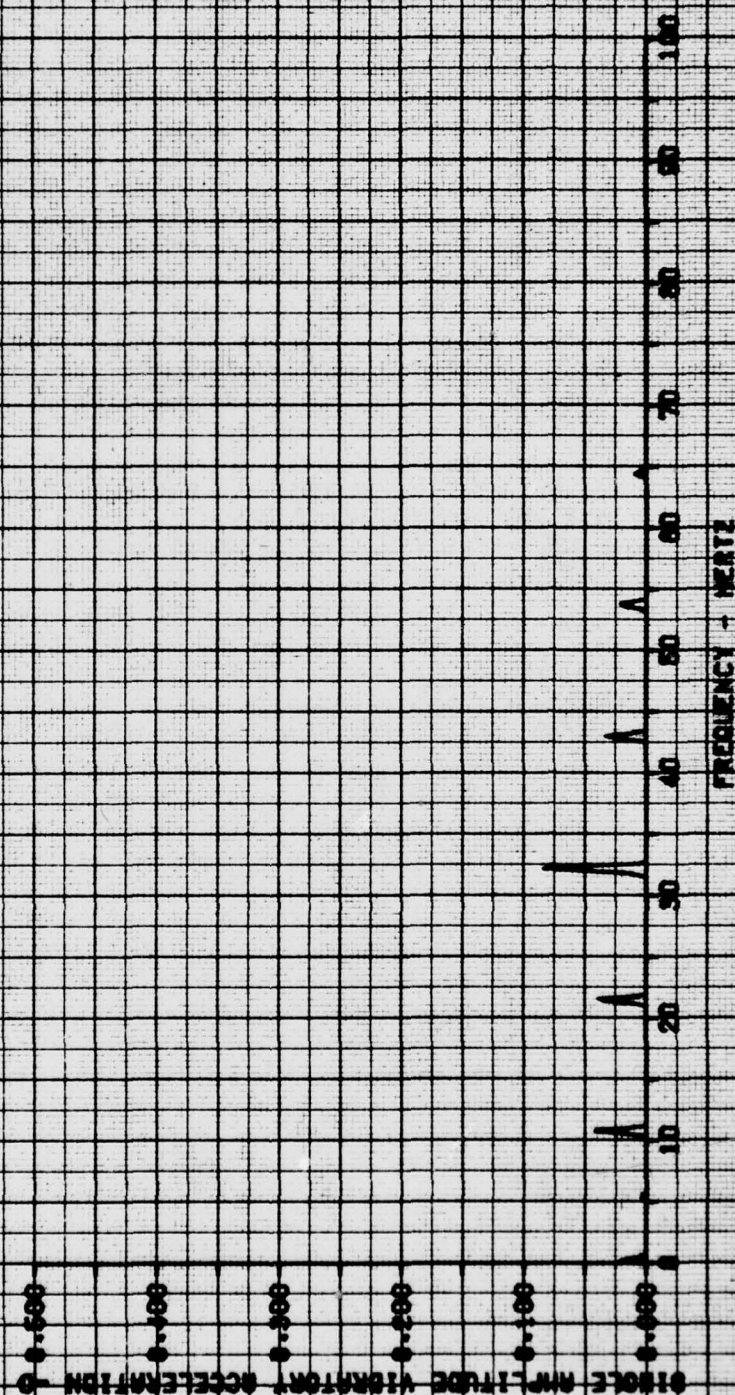


FIGURE 151

VIBRATION CHARACTERISTICS

NUH-1H USA S/N 86-60869
 FUNDAMENTAL FREQUENCY IS 5.40 HZ

LOCATION	TRANSMISSION	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.	FLIGHT	CONFIGURATION
AXIS	LONGITUDINAL	ALTITUDE	TEMPERATURE	SPEED	AIR SPEED	CONDITION	
CROSS	LONG	-FT	-DEG C	-RPH	-KTS		
HEIGHT	CG FS						
-LB	-IN.						
9240	135.4 (FWO) 0.0 (H10)	4220	9.0	824.0	80.0	LEFT TURN	CLEAN

FLT 5
 TRK 5
 WCD 70
 MRS 7
 MIN 27
 SEC 10
 CAP 0

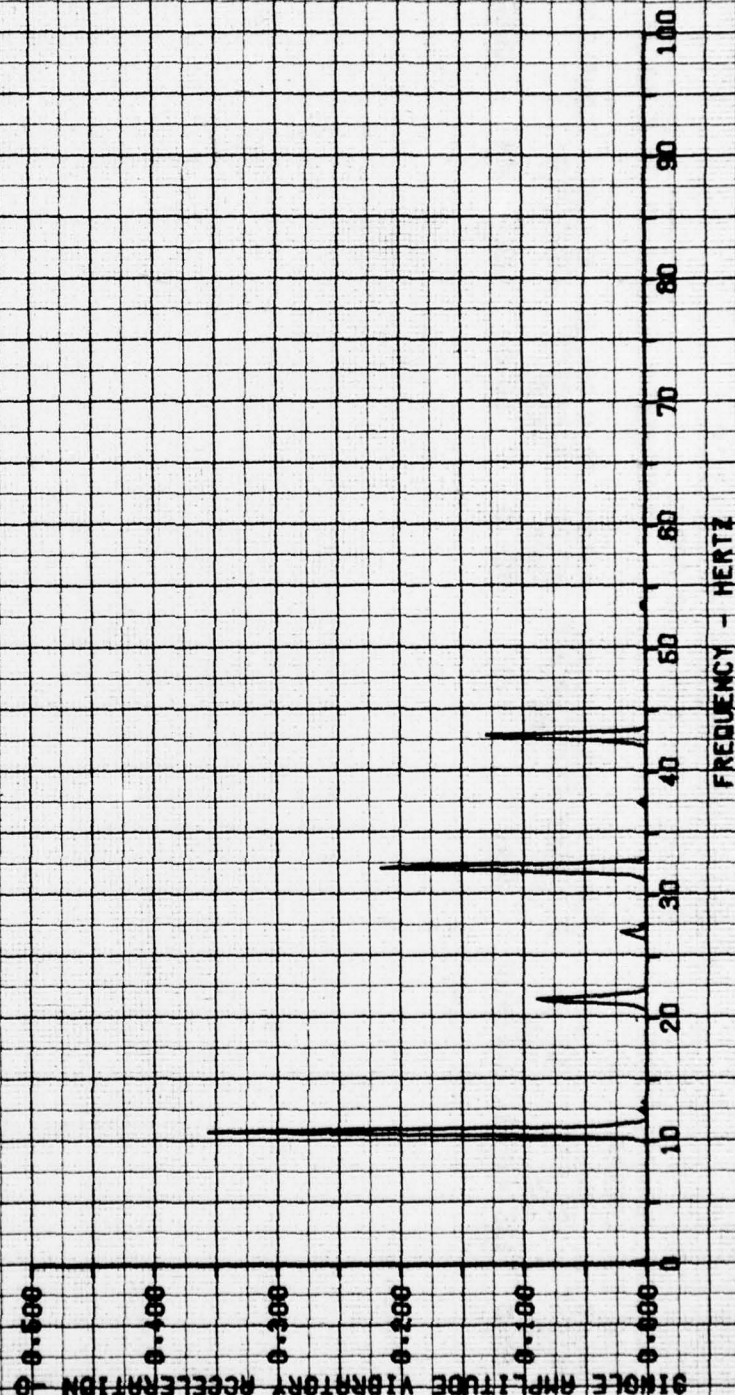
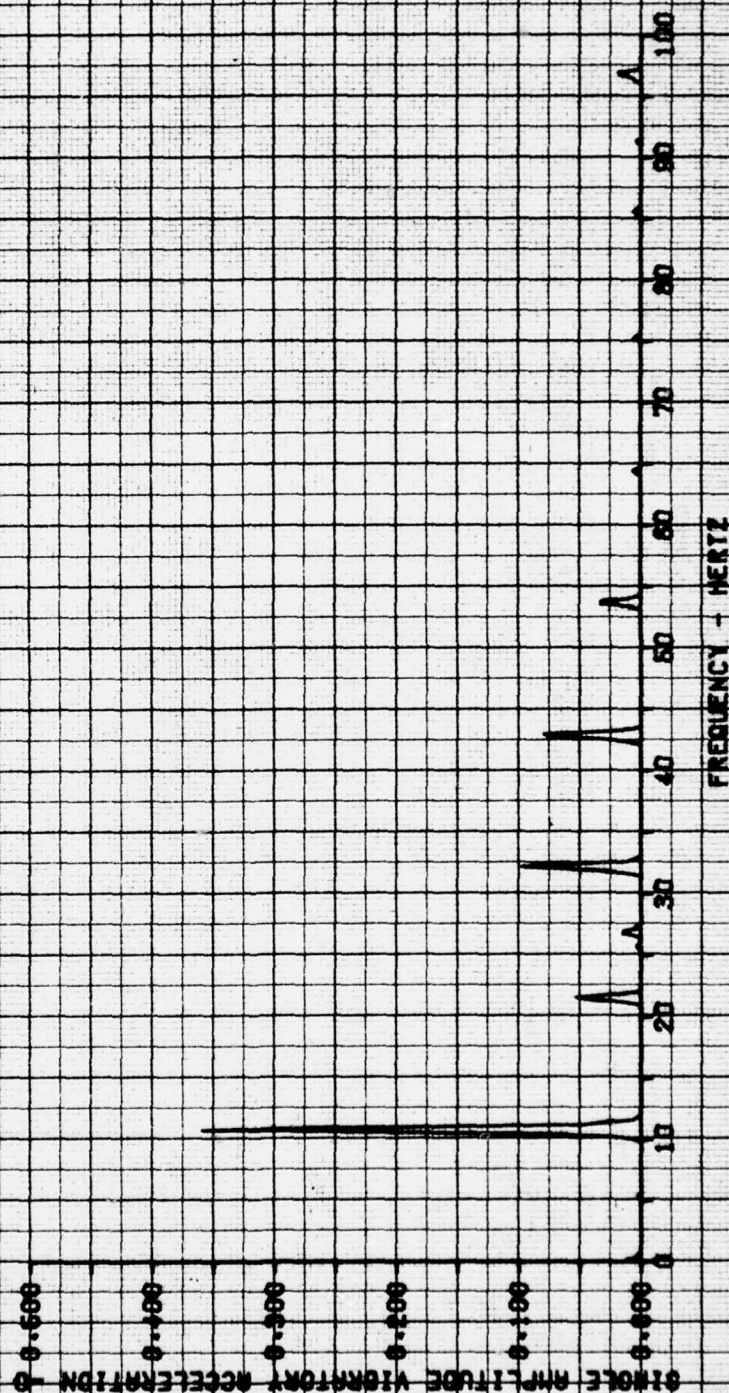


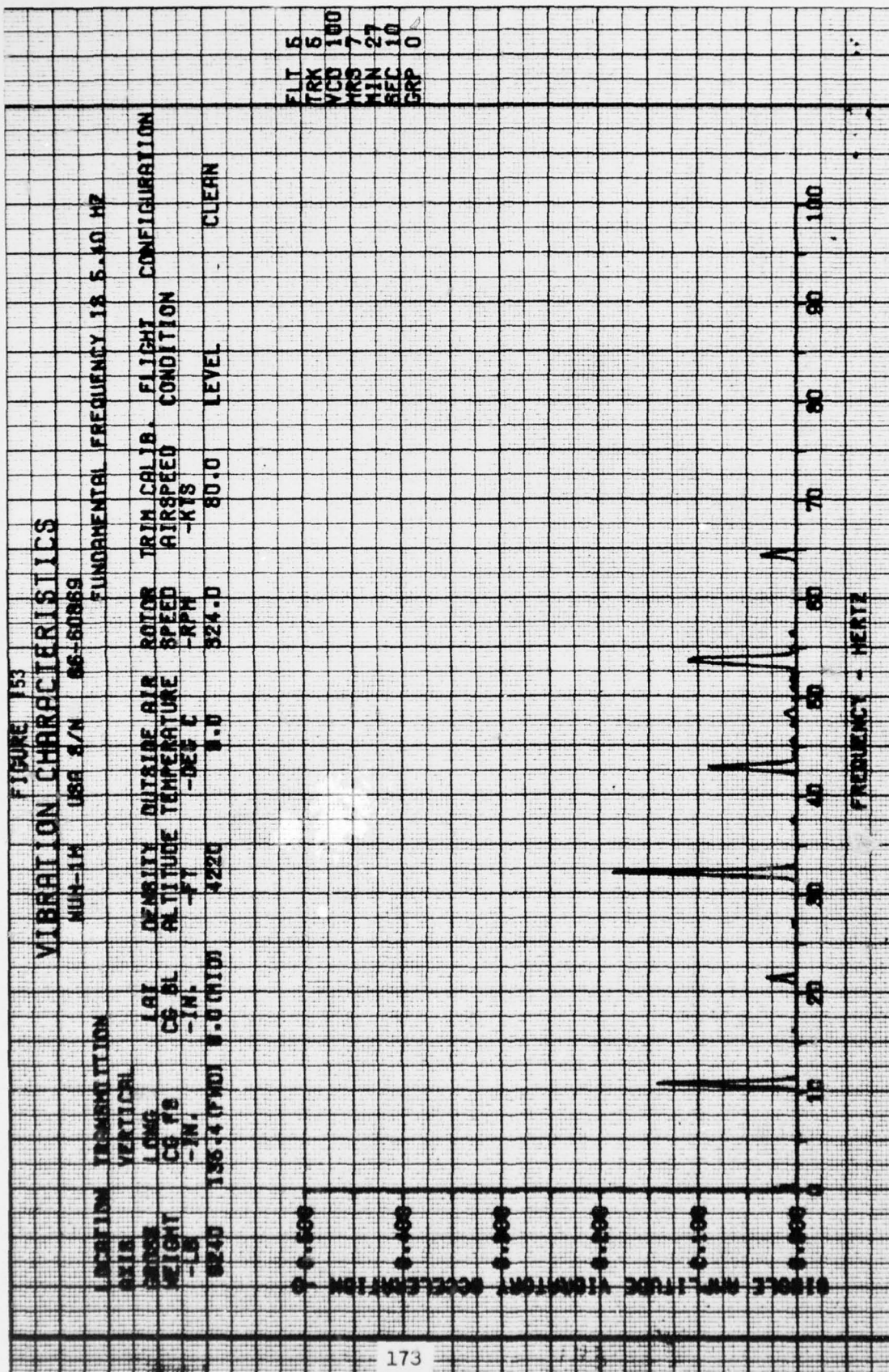
FIGURE 1B2

VIBRATION CHARACTERISTICS

LOCATION	TRANSMISSION	NUH-1H	USA 3/N	66-60869	FUNDAMENTAL FREQUENCY	18.5.40 HZ
AXIS	LATERAL					
PRODS	LONG	DENSITY	OUTSIDE AIR	ROTOR	TRIM CALIB.	FLIGHT CONFIGURATION
HEIGHT	CG FS	ALTITUDE	TEMPERATURE	SPEED	AIRSPED	CONDITION
-LB	-IN.	-FT	-DEG C	-RPM	-KTS	
9240	135.4 (FWD)	4220	9.0	324.0	80.0	LEFT TURN
	0.0 (HYD)					CLEAN

FLT 5
TRK 8
VIB 88
HNS 7
MIN 27
REF 18
COS 0





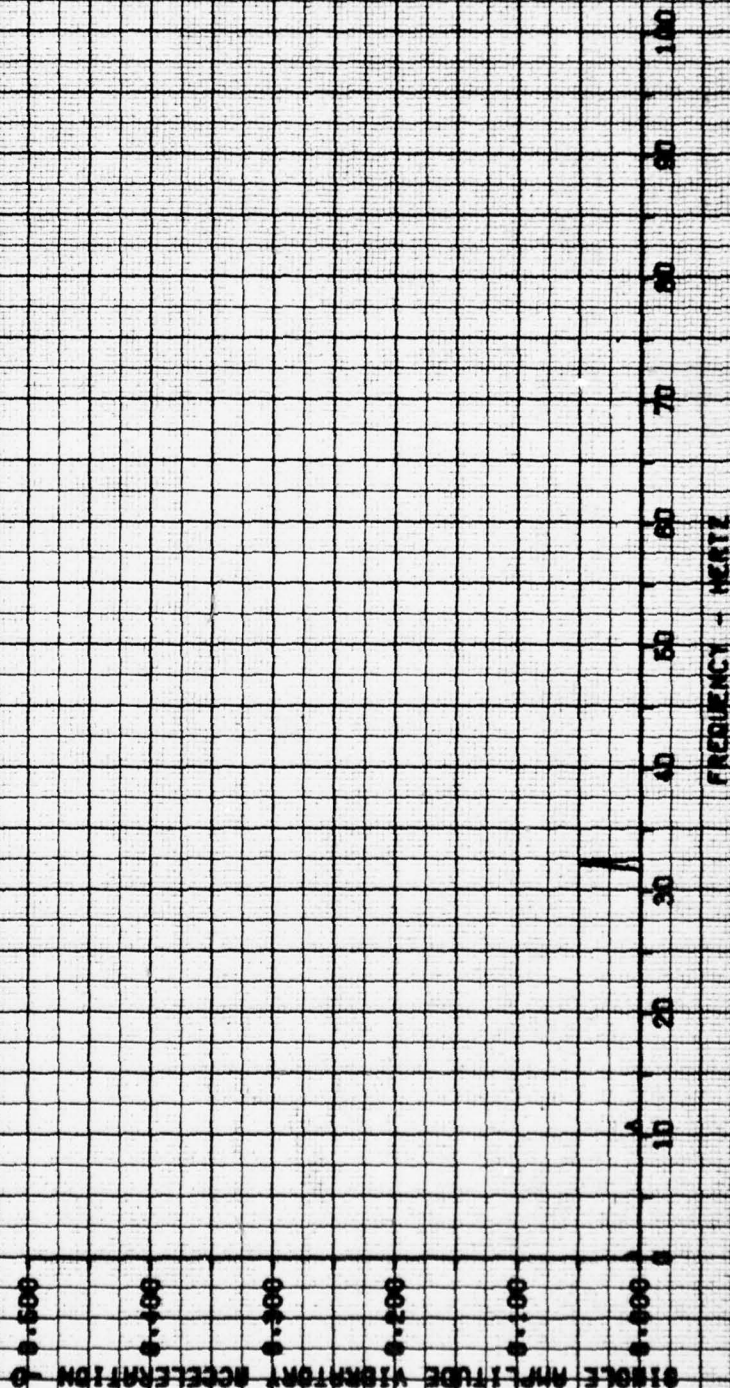
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FIGURE 154

VIBRATION CHARACTERISTICS

MUR-1H USA S/N 86-60869
 LOCATION POWER CONVERTER
 AXIS LONGITUDINAL
 CARRIER LONG LAT
 WEIGHT CG F'S CG BL
 -LB -IN. -IN.
 9240 135.4 (FWO) 0.0 (HYD)
 DENSITY OUTSIDE AIR ROTOR TRIM CALIB. FLIGHT CONFIGURATION
 ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION
 -FT -DEG C -RPM -KTS
 4220 9.0 324.0 80.0 LEFT TURN CLEAN
 FUNDAMENTAL FREQUENCY IS 3.10 HZ

FILT 5
 TRK 6
 VCB 26
 MAG 7
 MIN 27
 DEC 18
 EXP 0



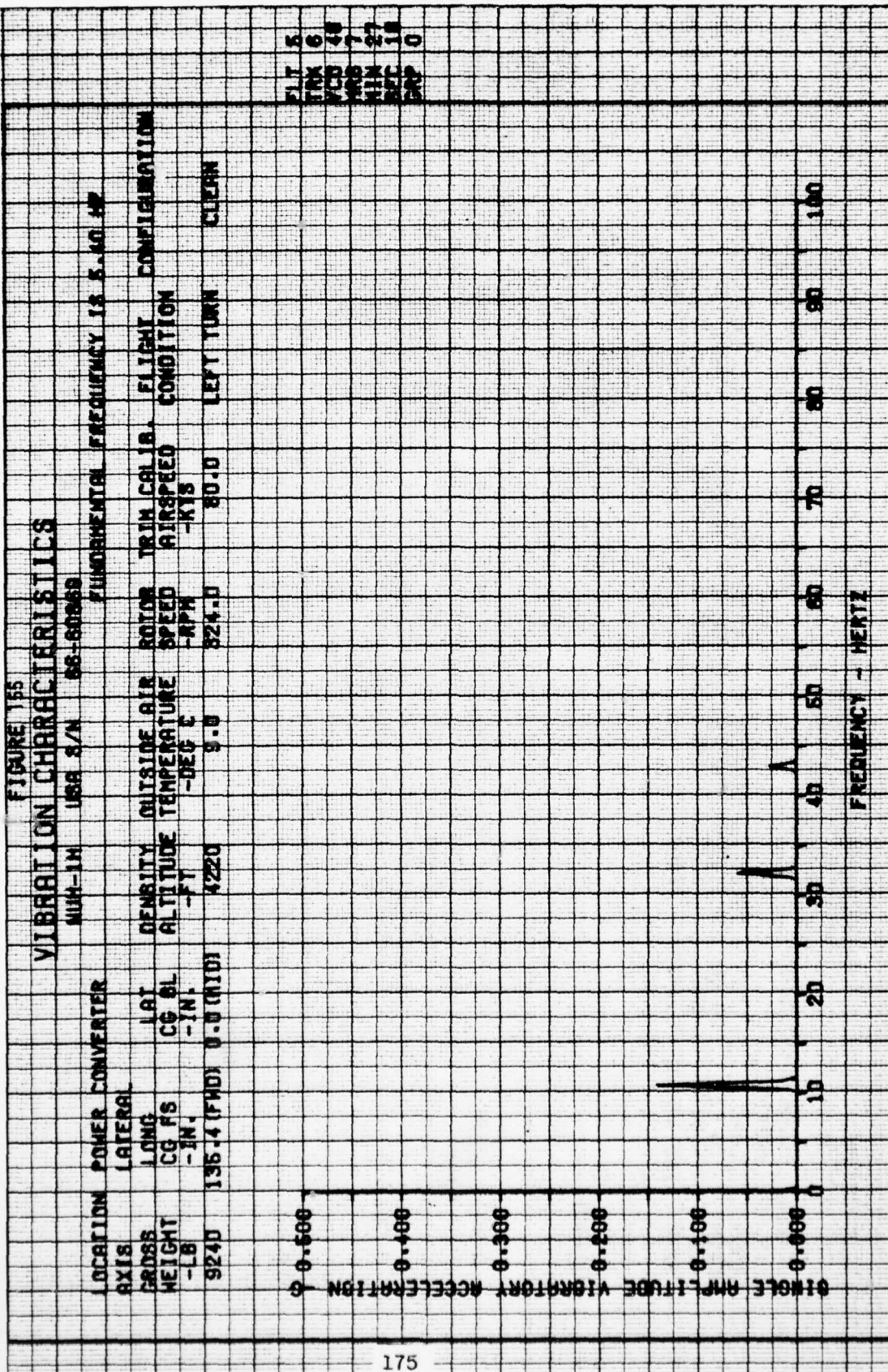
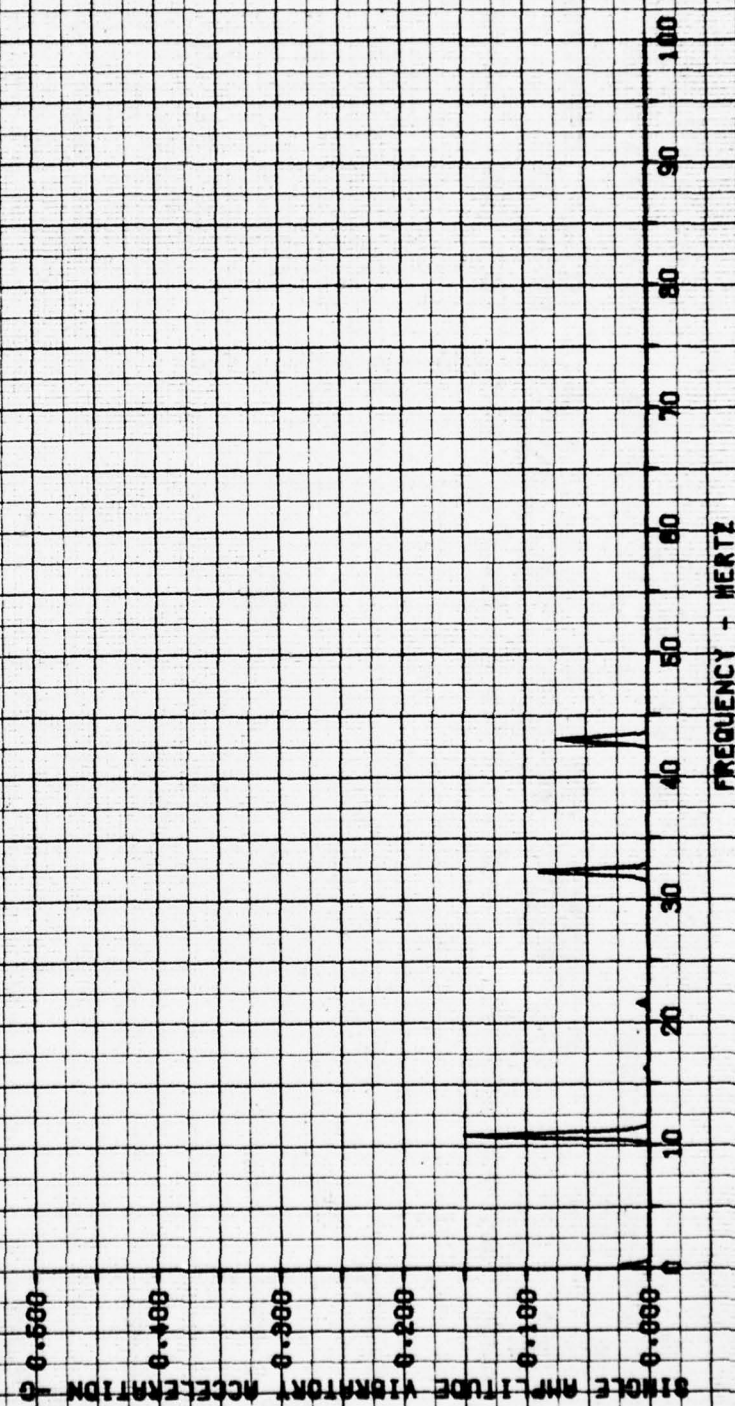


FIGURE 156

VIBRATION CHARACTERISTICS

LOCATION POWER CONVERTER
 AXIS VERTICAL
 GROSS WEIGHT 9240
 LONG CG FS 135.4 (FWD)
 LAT CG BL 0.0 (MID)
 DENSITY 4220
 ALTITUDE -FT
 OUTSIDE AIR SPEED 324.0
 TEMPERATURE -DEG C 9.0
 ROTOR IRM CALIB. 80.0
 AIRSPEED -KTS LEFT TURN
 FLIGHT CONDITION CLEAN
 FUNDAMENTAL FREQUENCY IS 5.40 HZ



FLT 5
 TRK 6
 VDO 55
 MAG 7
 MIN 27
 SEC 10
 CRP 0

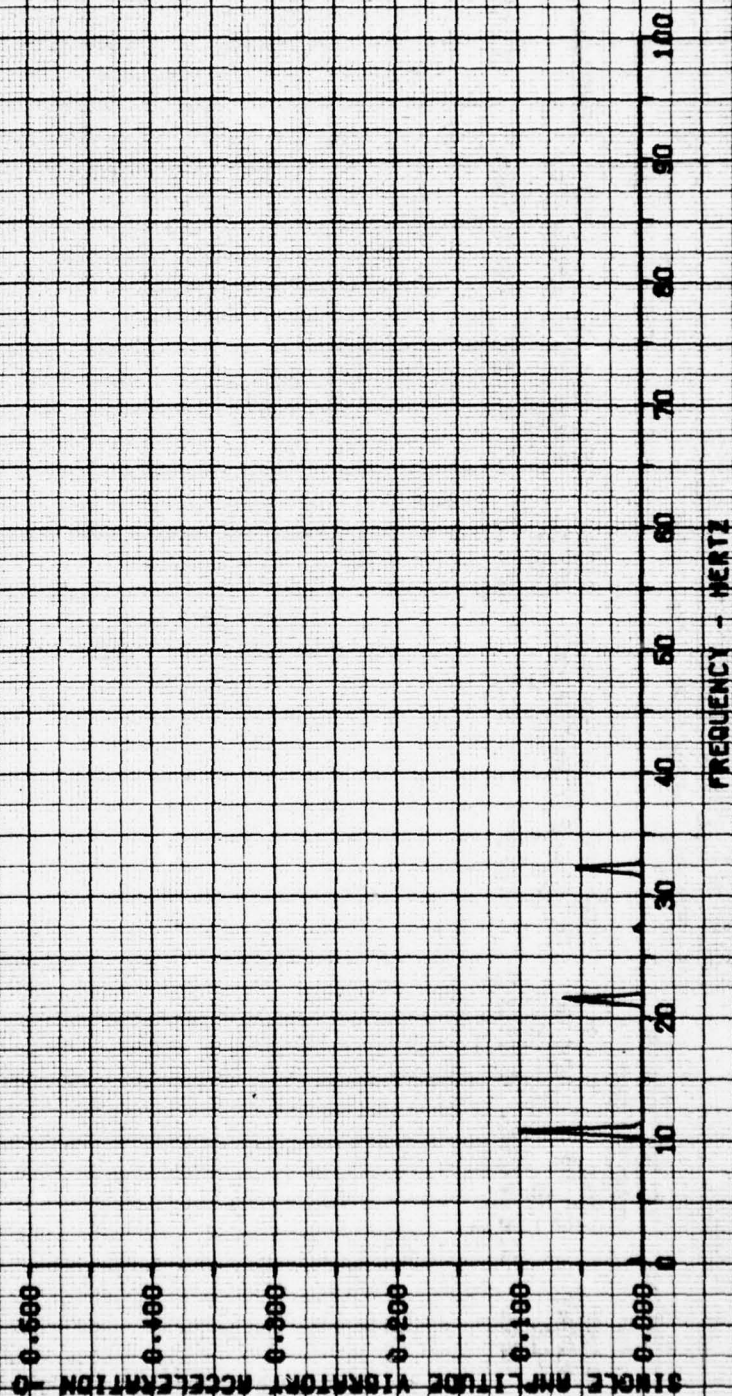
FIGURE 157

VIBRATION CHARACTERISTICS

LOCATION COLLECTIVE CONTROL
 AXIS VERTICAL
 CROSS LONG
 WEIGHT CG FS
 -LB 9240 135.4 (FWD) 0.0 (MID)
 DENSITY OUTSIDE AIR ROTOR TRIM CALIB. FLIGHT CONFIGURATION
 ALTITUDE TEMPERATURE SPEED AIRSPEED CONDITION
 -FT 4220 9.0 524.0 80.0 LEFT TURN CLEAN
 -DEG C
 -IN.
 -IN.

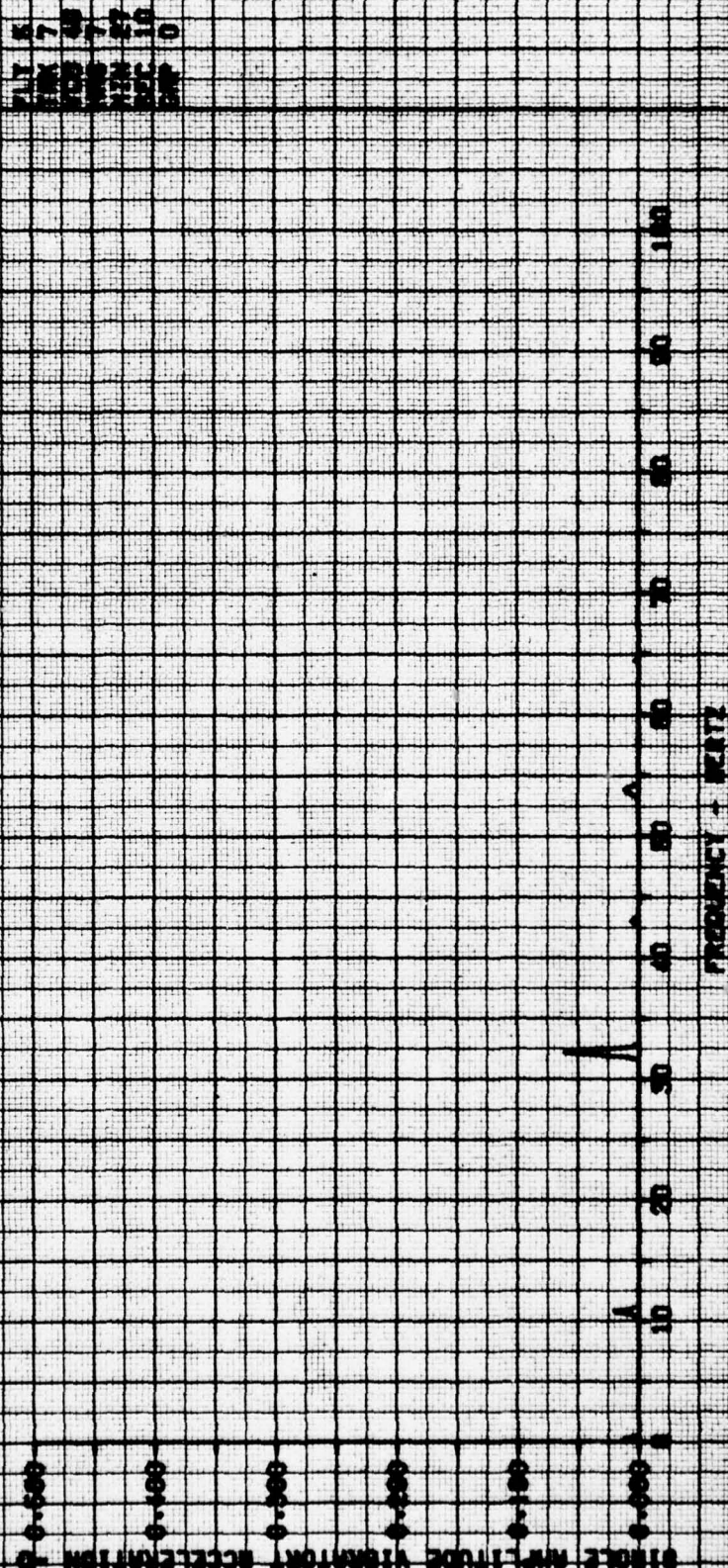
FUNDAMENTAL FREQUENCY IS 5.40 HZ

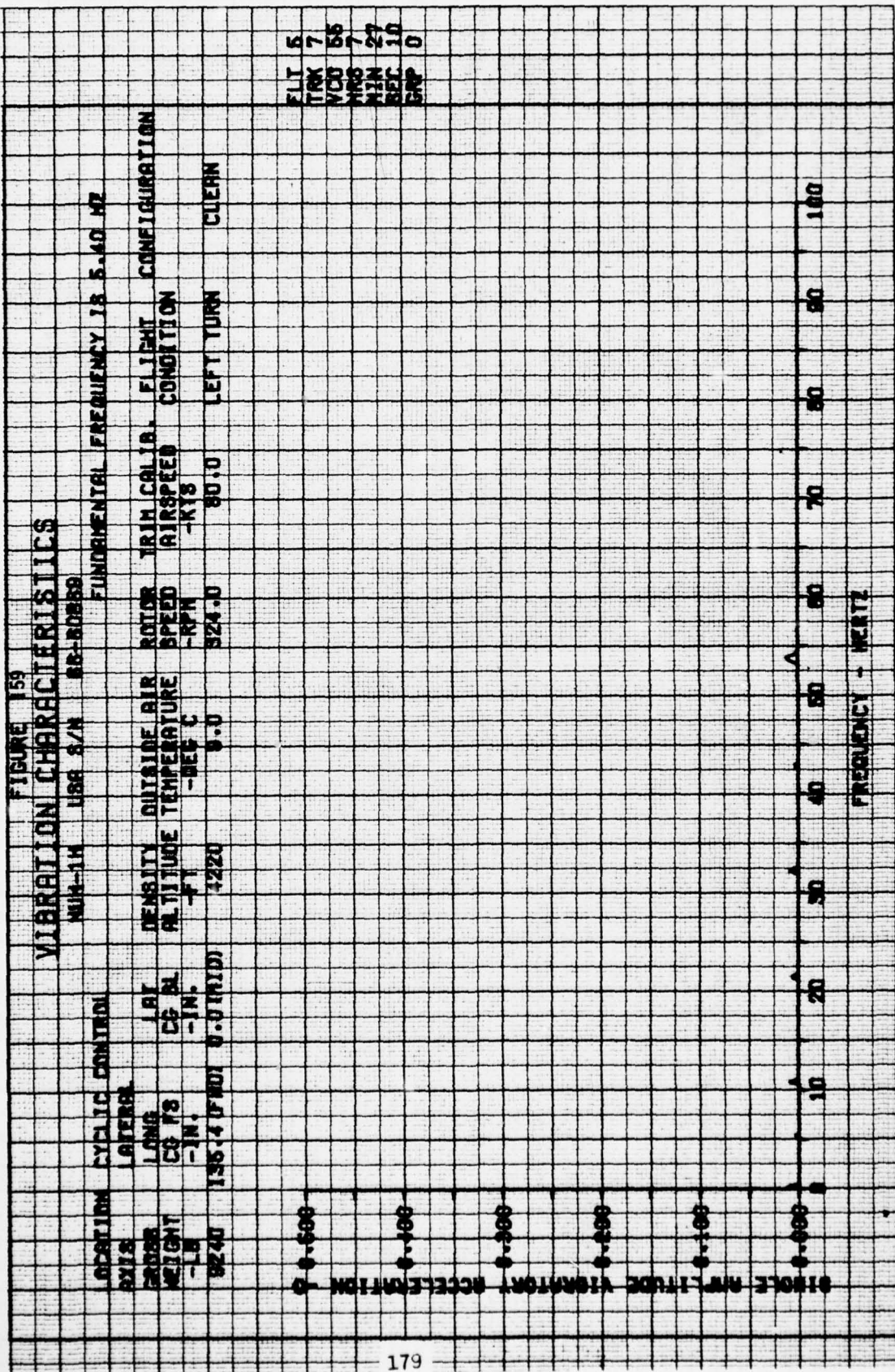
FLT 5
 TNK 7
 WDD 25
 MRS 7
 MIN 27
 REC 10
 GNP 0



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FIGURE 160

VIBRATION CHARACTERISTICS

LOCATION FORWARD PALLET FLOOR MOUNT
 AXIS VERTICAL
 GROSS WEIGHT 9240
 LONG CG FS 135.4 (FWD)
 LAT CG BL 0.0 (MID)
 ALTITUDE 4220
 TEMPERATURE 9.0
 ROTOR SPEED 524.0
 AIRSPEED 80.0
 FLIGHT CONDITION LEFT TURN
 CONFIGURATION CLEAN

USA 8/N 66-60869
 FUNDAMENTAL FREQUENCY 18 5.40 HZ

FLT 5
 TRK 7
 VCO 70
 HRS 7
 MIN 27
 SEC 10
 GRP 0

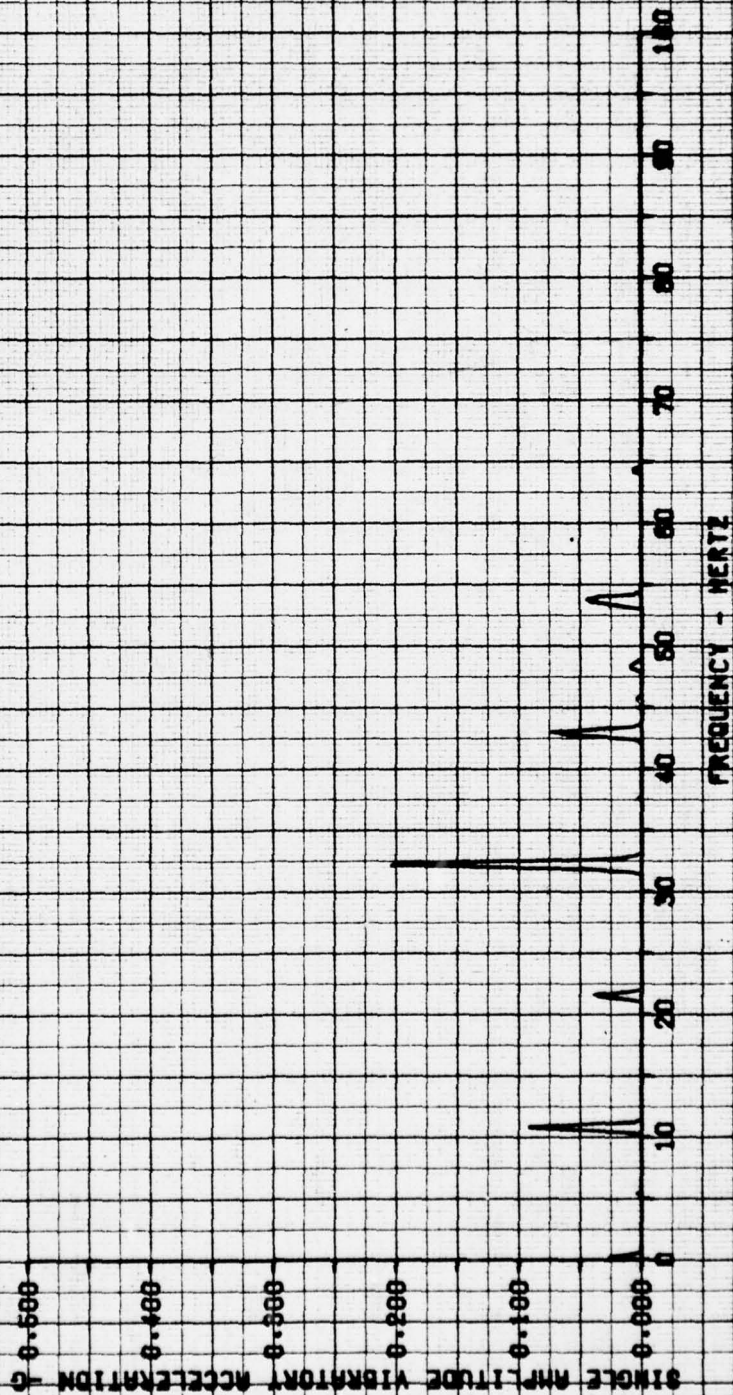
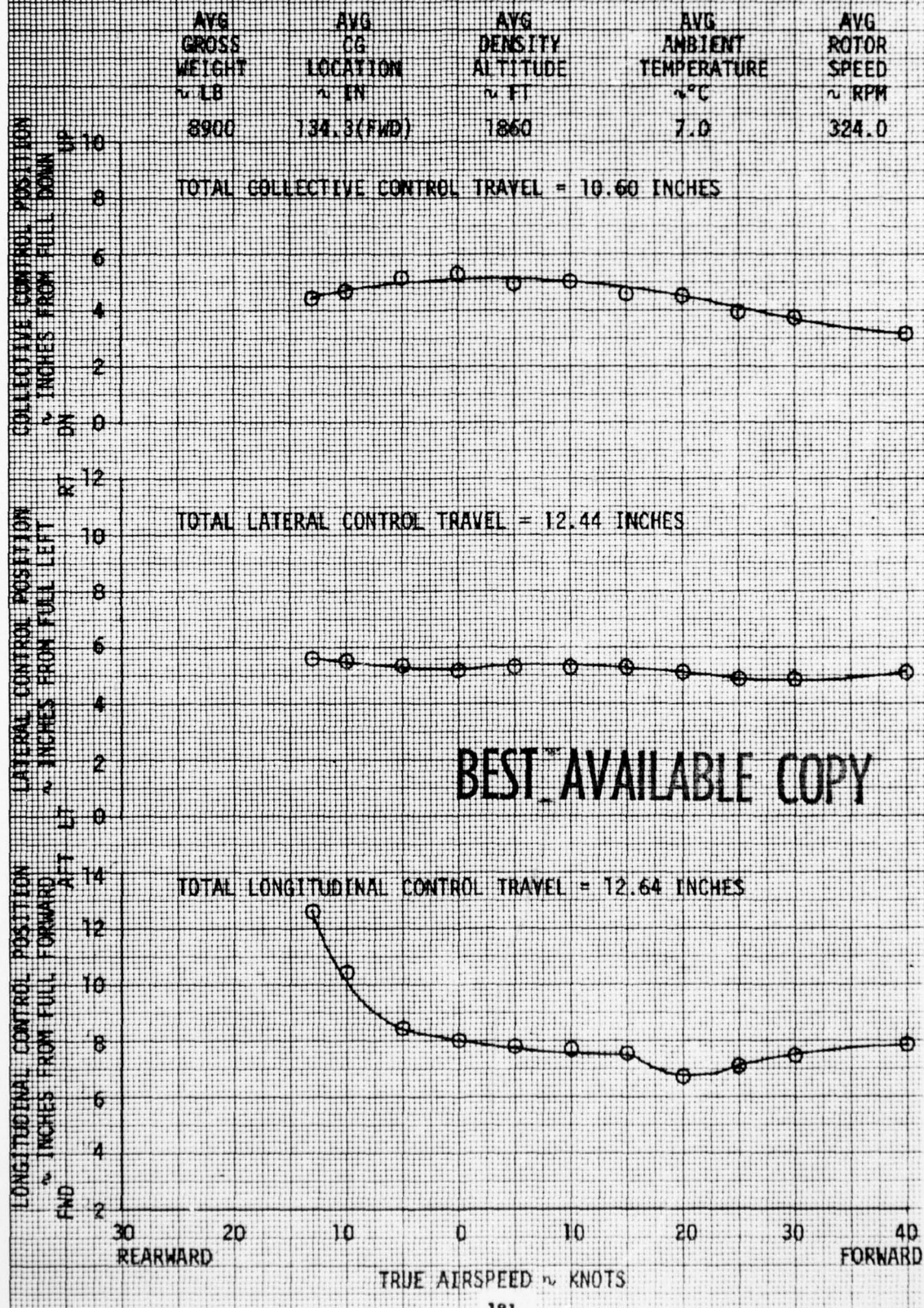


FIGURE 161
LOW-SPEED FORWARD AND REARWARD FLIGHT
NUH-1H USA S/N 65-60869



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